MINING WORLD

in this issue

How Castle Dome Becomes Copper Cities

Page 34

EIMCO

MINE PRODUCTION with Eimcos doing the loading will increase tons per man shift, cut development costs and provide greater safety for the men underground. Write for more information.

THE EIMCO CORPORATION
Salt Lake City, Utah, U.S.A.
Export Office: Eimco Bldg., 52 South St., New York City

MAY, 1954

Vol. 16 No. 6

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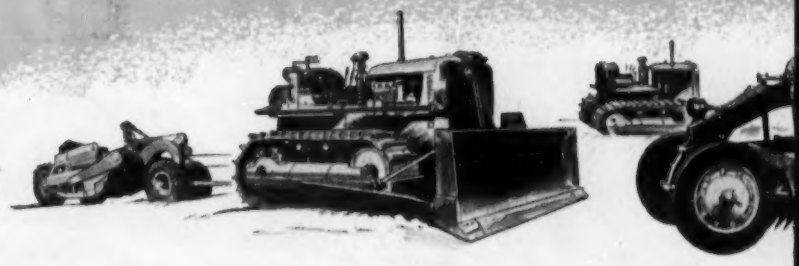

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Only your *Caterpillar Dealer* offers you this across-the-board selection. The best source of new machines, he's also your best source of used machines. Whether you're in the market for one, a few or many, he's the man to see for your *best* buy. See him today for complete details on guaranteed used machines!

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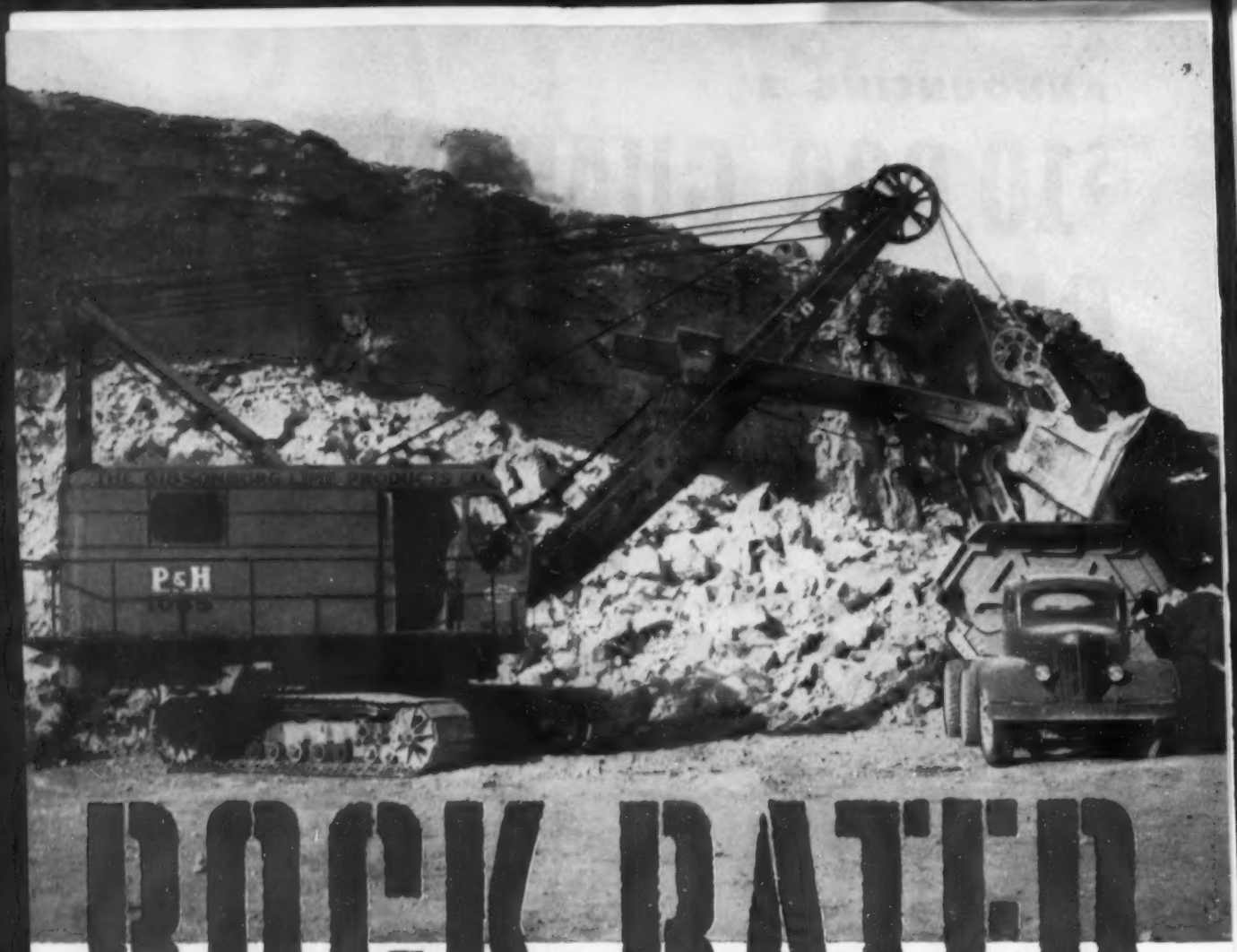

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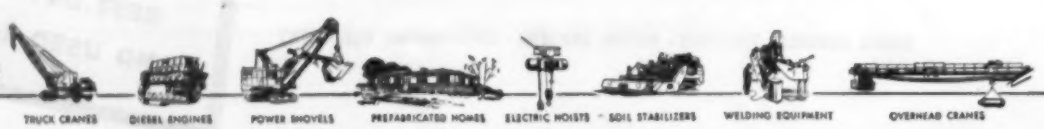

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Dear Sir:

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What I like best about MINING WORLD is that you present more of the news when it happens, and you present it in such a manner that it allows the reader to arrive at his own conclusions as to what the result of such news may be.

C. F. Starr
Area Vice President
Western Mining Council Inc.
Eureka, California

Unparalleled In The Field

Dear Sir:

At this time we would like to express our appreciation of your fine magazine and the interesting material it covers. Indeed, as a source of information on many subjects connected with mining we find it unparalleled in the field. Moreover we often find our customers referring to various articles contained therein.

P. Haffner
Manager
Ingersoll-Rand Limitada
Lisbon, Portugal

Field Chaps Find Valuable

Dear Sir:

I have been away in remote places on mining assignments and am still in the field. I am enclosing a PEP Card cut from one of your most excellent issues which was brought in to me yesterday.

Am anxious to contact the advertiser—South African Minerals and Merchandise Corporation—for clients of mine wishing to establish recommended representation in the United States.

The most valuable copies of WORLD MINING are stored for future reference as they contain the articles which we field chaps find most valuable.

John W. Greig
Consulting Engineer
Copmanhurst, New South Wales
Australia

Keeps Up With Mining

Dear Sir:

I find WORLD MINING most helpful in my work. It is most valuable for me to keep up to date with useful work done by other mining companies throughout the world.

I have been connected with mining in Brazil for five years, and were it not for your monthly issues, I would not now be aware of the many improvements developed in the mining field over these years.

Stephen E. Basch
Machado da Costa S. A.
Ave. Franklin Roosevelt
Rio de Janiero, Brazil

MINING WORLD

***Including the Export Edition* WORLD MINING**

Published monthly except in April when publication is semi-monthly

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THE COVER CIRCLE: The 12,000 ton per day copper flotation mill originally built for Miami Copper Company's Castle Dome operation has been dismantled, moved 15 miles, and is being re-erected as the Copper Cities mill. Detailed planning and accurate timing speed the mill transfer and stripping of the open pit Copper Cities mine.

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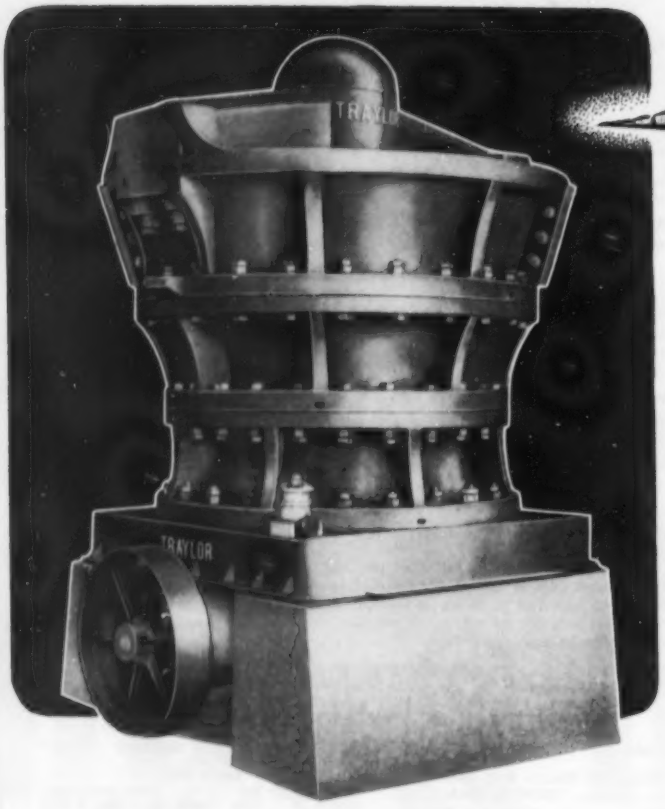
119,000,000 tons

AND STILL GOING STRONG



A TRAIN

16,227 MILES LONG

would be needed to carry the output of a typical

TRAYLOR 60" GYRATORY

ONE 60" Traylor Bulldog Crusher, installed in 1942, has worked continuously for 10 consecutive years. As a result it crushed well over 119 million tons of ore . . . and is still producing 6" ore at the rate of 3,984 tons per hour. Today, Traylor TC Gyratory Crushers, equipped with their original non-chokable bell head and curved concaves, continue to set amazing production records throughout the world. Traylor curved crushing surfaces apply power as a *direct* crushing force to reduce lifting and churning of material in the crusher. Each succeeding zone in the crushing chamber is of greater capacity . . . thus, choking and packing are practically eliminated. These features cause less wear on crushing surfaces . . . enable the Traylor TC to stand up to long years of steady and continuous operation with only routine maintenance.

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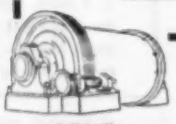
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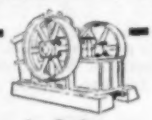
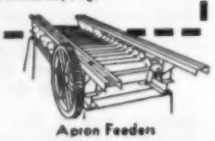

Jaw Crushers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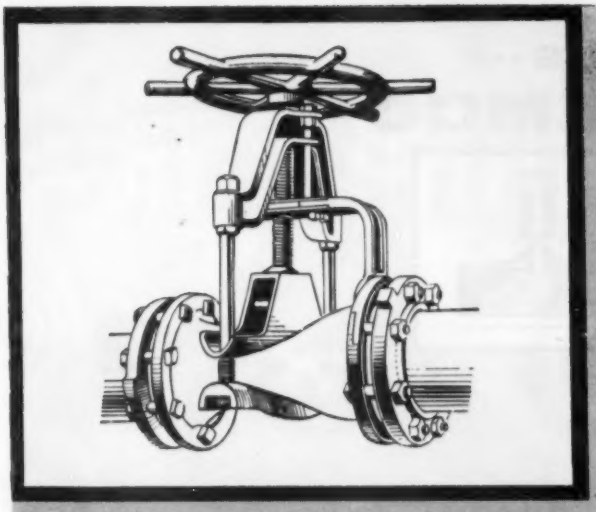

MASSCO-GRIGSBY rubber PINCH VALVES FOR ABRASIVE PULPS

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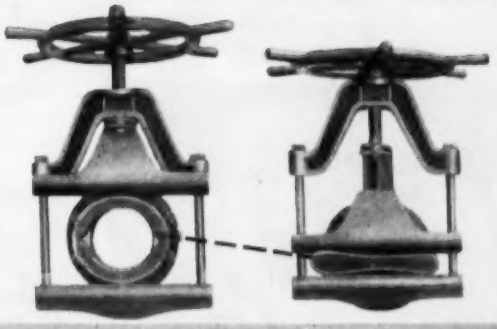
FOR LONGER WEAR

Recesses molded into opposite sides of the sleeve serve as "hinges" during compression. This patented feature prevents undue strain and eliminates breakage and excessive wear due to valve adjustments.



MOLDED RUBBER RESISTS ABRASION

...gives Long Life without Maintenance

The sleeve is made of molded natural rubber reinforced with fabric; will withstand pressures to 150 lbs. per sq. in., temperatures to 180° F; freezing temperatures are not harmful.

The Massco*-Grigsby Rubber Pinch Valve has a straight, unobstructed flow passage which eliminates high friction losses; there are no packing glands; gives positive, leak proof closure; withstands all chemicals not harmful to rubber or neoprene.

Sizes: 1", 1½", 2", 3", 4", 5", 6", 8", 10", 12", 14"

*Both Marcy and Massco are registered trademarks.

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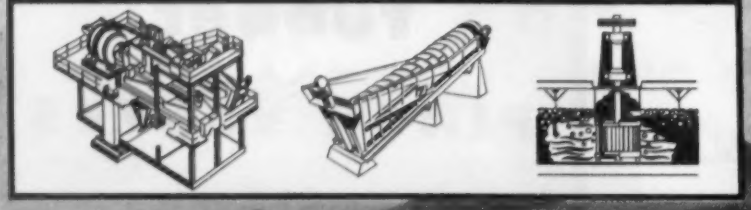

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S-H CLASSIFIERS

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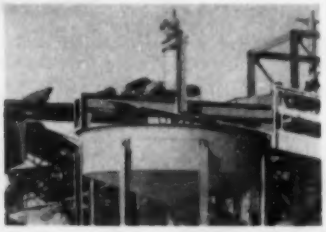
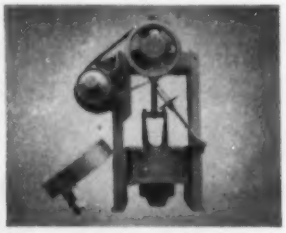
Behind these familiar products is the WEMCO name and reputation — the reason you rely on WEMCO equipment to do your job **best.**

— *but here's something you may not know*

— WEMCO **also** makes a complete line of Thickeners, Hydroseparators and Diaphragm Pumps. Because they give you true WEMCO value — in performance, economy and reliability — you'll want to know more about them. Look over these specifications... it **pays** to know WEMCO.





WEMCO THICKENERS:

Sizes and Types: WEMCO Thickeners are job-tailored to specific applications and are available in sizes up to 400′ diameter. Job requirements determine use of Beam (up to 45′), Lo-Truss (32′ to 60′), Hi-Truss (60′ to 100′), Center Pier (75′ to 175′) or Traction (125′ to 400′) type of construction.

Features: Depending on application, WEMCO Thickeners offer a wide choice of construction and mechanical features. These include: heavy duty worm or spur gear mechanisms and bearings; large feed wells; strong cast spiders; overload alarms; manual or motorized screw lifting devices on small sizes; vertical hydraulic lift on Center Pier type; chain and sprocket gear-motor drive on small sizes; dual fluid drive on Center Pier and Traction types; large diameter discharge cones; wood or steel tanks.

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Features: Depending on job requirements, WEMCO Hydroseparators offer a wide range of construction and mechanical features, including: heavy duty worm gear mechanisms and bearings, large diameter cold rolled steel shafts, large feed wells and discharge cones, strong cast spiders, manual or motorized lifting devices and efficient drive arrangements.

WEMCO DIAPHRAGM PUMPS:

Sizes and Types: WEMCO Diaphragm Pumps are available in 2″, 3″ and 4″ sizes. Each size can be obtained in either simplex, duplex or triplex arrangements.

Features: WEMCO Diaphragm Pumps are designed and built for efficient, trouble-free operation. Features include: Rugged welded steel frame, uniformly weighted rubber ball valves, rubber valve seats, long wearing rubber diaphragm, adjustable stroke and indicator, handwheel-operated variable speed drive for speed adjustment while pump is in operation.

FOR FURTHER INFORMATION—Call or write to your nearest WEMCO sales engineer. He will be glad to give you full details.

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"Scramming" on the Mesabi

INTERNATIONAL TD-14A puts speed and power into one of the first operations of its kind in the east end of Mesabi Range. Lenci & Politano took the "scramming" contract for the removal of small pockets and deposits of ore remaining after the big equipment had been taken away. They report the little crawler was just right for the close quarters and heavy going.

INTERNATIONAL Crawler makes a big impression on east end of the Range

What's "scramming?" It's cleaning up the small pockets and deposits of ore that remain after main ore body has been worked. It is a job that brings out the special abilities of smaller crawlers in the complete INTERNATIONAL line according to Lenci & Politano, "scramming" contractors in the east end of Mesabi Range.

An INTERNATIONAL TD-14A was used in the operation. Operator Leonard Lehman, who had always handled big crawlers before, has this to say:

"The way that tractor can get around in tight corners and the size of the load it can handle were things I had not expected. It showed me there is a place for the smaller INTERNATIONAL crawler even in such a big operation as mining the Mesabi Range!"

Do you need big power—little power—or somewhere in between? See the man who can fix you up just right, and keep it rolling for you. That's your INTERNATIONAL Industrial Distributor. Get in touch with him soon for a demonstration of "power that pays!"

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

For everything in Earthmoving

ON TRACKS ...ON RUBBER

See INTERNATIONAL'S Complete Earthmoving Line

INTERNATIONAL HARVESTER

POWER THAT PAYS

INTERNATIONAL

An EIMCO Agidisc Filter
8' Diameter x 4 Disc Unit

INCREASE PRODUCTION and LOWER MOISTURE CONTENT

in dewatering metallurgical slurries with fast settling solids

Two critical factors in dewatering of metallurgical slurries with fast settling particles are improved by using Eimco Agidisc Filters.

These dependable filter units have been used on many different materials with remarkable success. In the dewatering of a copper concentrate an Eimco Agidisc was installed beside a filter of standard disc design. The Agidisc produced from 20-25% more tonnage and the discharged cake contained 1½-2% less moisture.

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Other installations are showing equally as good or better results.

Let an Eimco engineer tell you about the Agidisc. Write for a bulletin on the Agidisc to The Eimco Corporation, Box 300, Salt Lake City, Utah.

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THE EIMCO CORPORATION

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You Can't Beat An Eimco

LIMA Type 44 ANSWERS DEMAND for One yard shovel and 25 ton crane

(AVAILABLE WITH CRAWLER, WHEEL OR TRUCK MOUNTING)

To meet the need for a 25 ton crane and 1 cubic yard shovel, Baldwin-Lima-Hamilton Corporation, is now producing the LIMA Type 44. As a shovel, it is equipped with 20 ft. boom and 15 ft. dipper handle. This latest addition, fills an important spot in the LIMA line, between the famous Paymaster (17½ ton crane—¾ yard shovel) and model 604 (35 ton crane—1½ yard shovel).

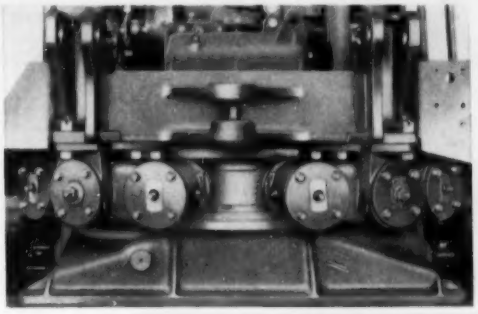
Like its smaller brother, (Paymaster, Type 34), the LIMA Type 44 is available, with either crawler or rubber mountings. Wider, longer crawlers for greater stability and double sets of front cone rollers, to distribute the load more equally over a wider area, are some of the major design features.

For your copy of our Type 44 bulletin, please contact your nearby LIMA distributor, or write to Construction Equipment Division, Baldwin-Lima-Hamilton Corp., Lima, Ohio.

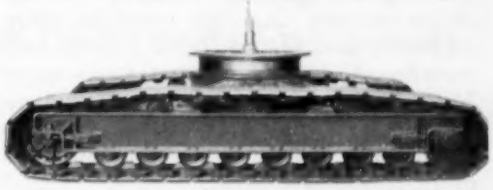
COMPARE!

No other machine gives you as much as LIMA!

1. All gears, smaller parts and shafts which are subject to extra wear, are flame or induction hardened for longer life.
2. Main machinery is placed well back of center of rotation, to eliminate excess counterweight.
3. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
4. Big capacity drums and sheaves, lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
5. Propel and swing gears and power take-off, are enclosed in a sealed oil bath for dirt elimination and smoother, quieter operation.
6. Torque converter (optional), automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
7. COMPARE and you'll specify LIMA for shovels, (¾ cu. yd. to 6 cu. yds.), cranes (to 110 tons) and draglines (variable).



The conical rollers are the hook type, four in front and two in the rear. The four front rollers are arranged in pairs and each pair is mounted in an equalizer frame.



An extra long Crawler (15'-0" long, 10'-8" wide), is available for work requiring greater stability.

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Construction Equipment Division

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The Galigher laboratory—at your service—has the facilities and engineering skills required to meet and solve any problem of ore recovery. Our work covers the entire metallurgical range of finding and specifying the appropriate treatment, the optimum flowsheet and the projected end-results in ore beneficiation. Many years of successful pioneering experience, on a world-wide scale, is your assurance that collaboration with Galigher metallurgists will lead to the efficient procedure and operation of your treatment plant.

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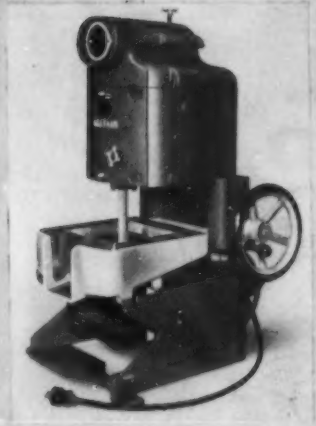

New, streamlined model of the 3 in 1 laboratory Agitair. Operating capacities of 500, 1000, 2000 gram possible with changeable parts. Variable speed . . . built-in tachometer. Ball crank lifts impeller, motor and drive unit to facilitate cleaning.

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Five 36" sq. Dorrco Pan-American Placer Jigs at McIntyre-Procupine Mines Ltd. in closed-circuit with ball mills and Dorr Classifiers. Operation of first Jig, installed in 1951, resulted in repeat order for four more. Total Jig capacity is 210 TPH of dry solids.

For Gold Mill Grinding Circuits

Dorrco Pan-American Jigs give you the area you need to get the recoveries you want!

You need more than just a vibrating launder for efficient recovery of free gold in grinding circuits. The critical factor in jig design is *area*. Without sufficient area the linear velocity of pulp across the bed is too great to give satisfactory recoveries. With the Dorrco Pan-American Jig, active bed area is 90% of required floor space. This maximum utilization of area means slower cross-flow across the unit with a resulting increase in hutch recovery.

Other plus features of the Dorrco Pan-American Placer Jig include:

Uniform distribution of pulsations . . . movable hutch is mechanically actuated in a vertical line with the bed.

Minimum maintenance . . . due to simplicity of mechanism, long diaphragm life and positive lubrication.

Quickly replaceable bed . . . basket grid assembly is easily removed and very little time is lost changing beds.

Adjustable length of stroke . . . nine different settings are possible to meet varying requirements.

Maximum recovery of gold "as soon as free" is essential to good mill operation. For more information on the Dorrco Pan-American Placer Jig write for Bulletin No. 2401. The Dorr Company, Stamford, Conn. or in Canada, The Dorr Company, 26 St. Clair Ave., East, Toronto 5.

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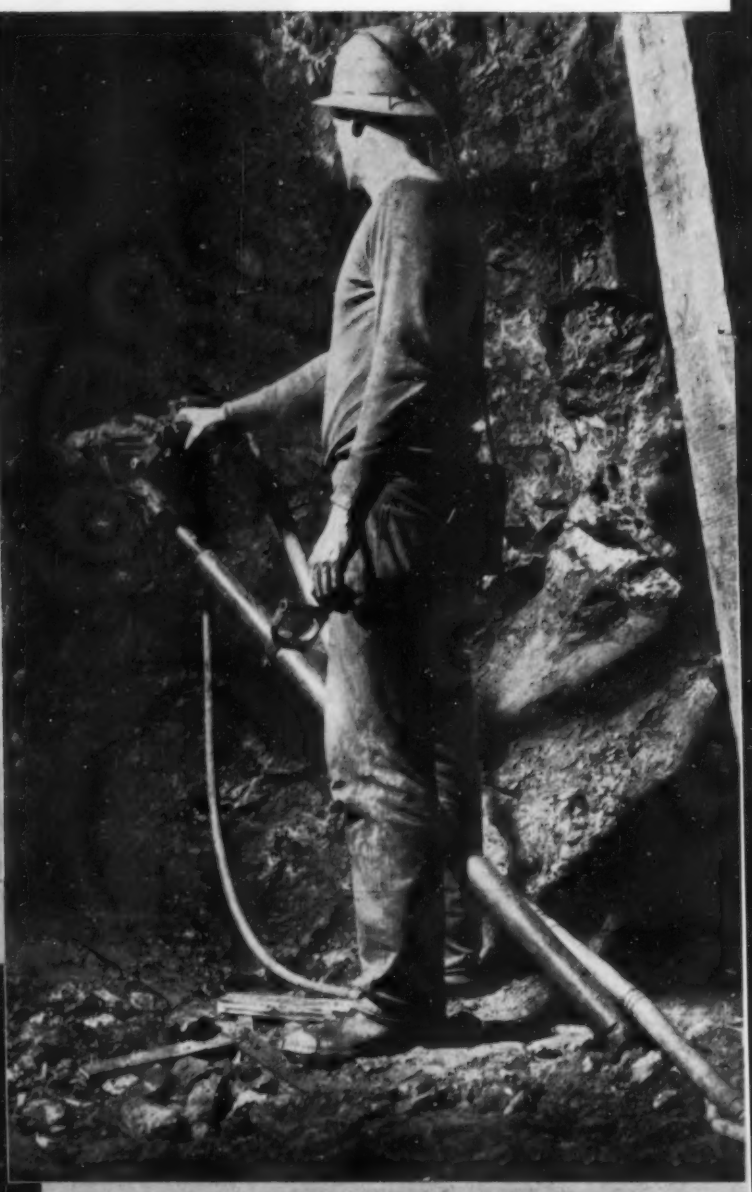
Here's the COST-CUTTING DRILL

TUNGSTEN—*This driller bottoms holes quickly and easily with the Joy combination in a tungsten mine.*

COPPER—*This driller, in a square set stoping operation can stand safely back from the face while he drills a round with the Joy Air Leg and LM-47.*



COPPER—*This Joy Air Leg and LM-47 Drill make it easy to drill off a drift round in this Arizona copper mine.*

IRON ORE—An adaptation of the Joy Air Leg for drilling soft ores in the Iron Country is this model equipped with the Joy H-37 auger drill. Versatility of the Joy combination is shown here in its use as a stoper, an arrangement made possible by mounting in such a way that the drill and leg may be placed in almost parallel positions.

with "ONE-HAND CONTROL"!

JOY Air Leg and LM-47 Drill

Ever think you'd find an air leg and drill combination that would meet as many cost-cutting and ease-of-handling requirements as this?

1. One-hand feed control built into the backhead—easy to handle.
2. Outdrills any other drill and leg in competitive tests.
3. Has lower maintenance cost than any other drill and leg used in the same mine.
4. Well-balanced for ease of handling and for minimum misalignment of drill and steel.
5. Lightweight and easily assembled, dismantled and moved around the mine.

That's the story of the Joy Air Leg and LM-47 Drill. They're a perfectly matched pair. Write today for complete information. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

NICKEL—*This driller shows "one-hand" operation of the Joy Air Leg and LM-47 as he drills face holes in a nickel mine.*

IRON ORE—*Face drilling in hard ores is not a tough job at all with these Joy legs and LM-47 drills.*

Consult a Joy Engineer

W & D M 5072

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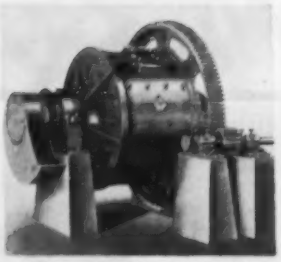
WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

Denver Jaw Crusher



Denver Steel Head Ball Mill

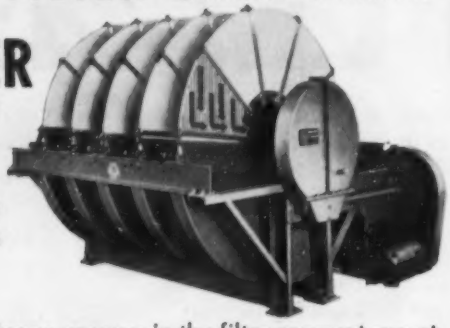
Denver Standard Dryer

Denver Drum Filter

Denver Diaphragm Pump

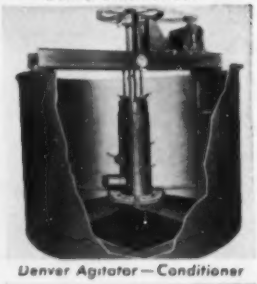
DRIER FILTER CAKE WITH...

DENVER DISC FILTER



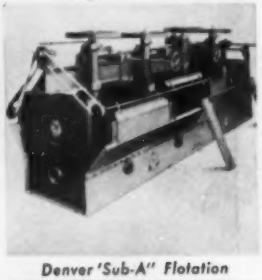
Denver-Dillon Screen

Denver Spiral Classifier



Denver Agitator—Conditioner

Denver Automatic Sampler



Denver 'Sub-A" Flotation

Denver Testing Service

Denver Hydroclassifier

See how drainage grooves in the filter segment run at right angles to the suction edge of the filter segment?

This patented feature on DENVER DISC FILTERS mean positive drainage from each segment; no blow-back of filtrate into filter cake. RESULT: DENVER DISC FILTERS give drier filter cake.

SIZES: 2′ x 1-disc through 6′ x 8-disc and larger.

OTHER FEATURES:

Divided tank permits filtering 2 products with same filter. Filter segment can be replaced while filter is in operation. Drive mechanism and valves are protected from dirt and slime. DENVER DISC FILTERS are simple in design; simple to operate and maintain.

FREE FILTER TESTS:

DENVER EQUIPMENT COMPANY will conduct filter tests free of charge to determine proper size and type filter for your requirements. Write today!

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AMSCO DIPPERS FOR MINES

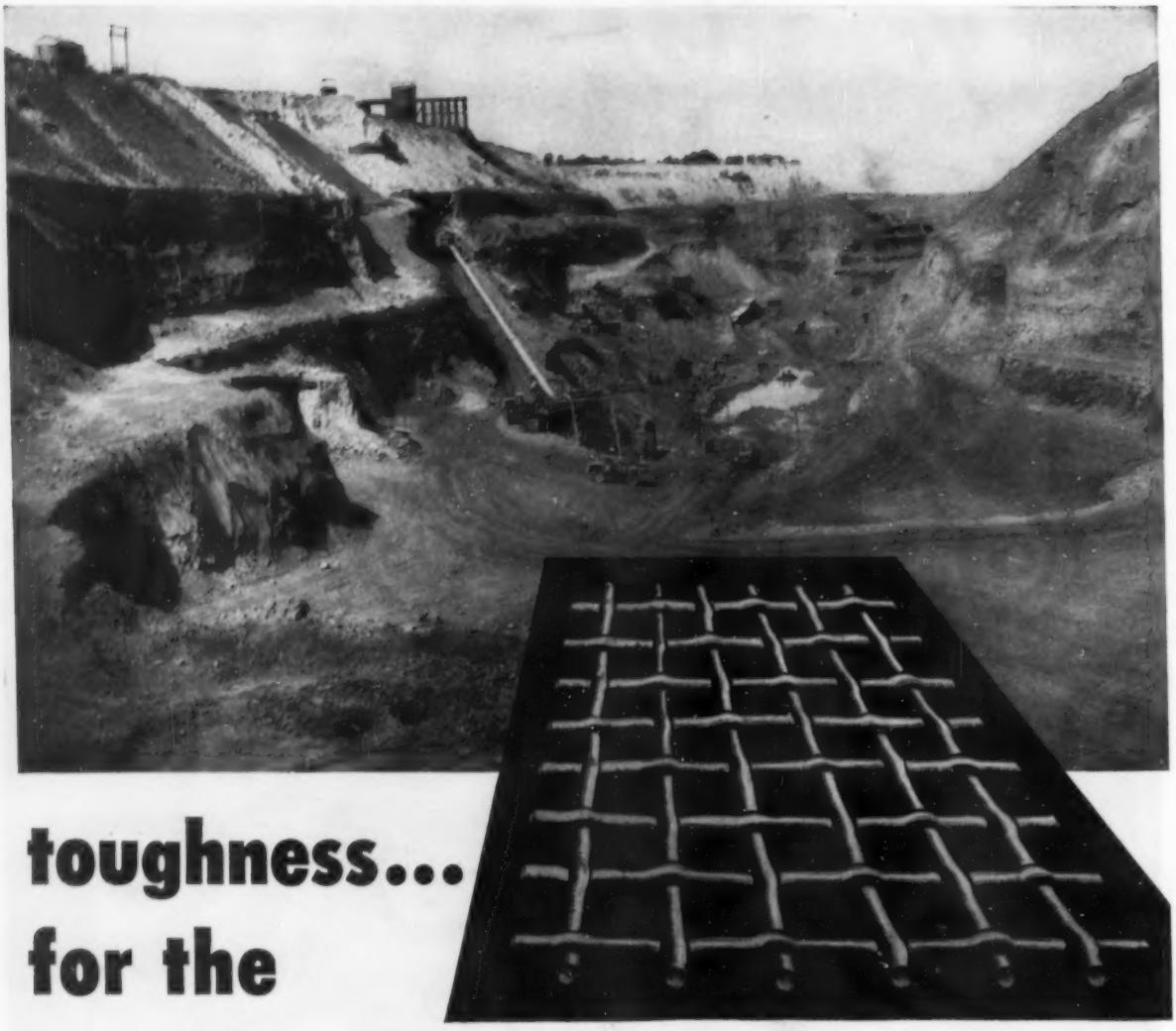
Mine superintendents with years of on-the-job experience, regularly specify manganese steel dippers on new equipment. Most specify by name—Amsco.

The reason is obvious. Amsco manganese steel dippers will stand up longer under rugged mine treatment and down time will be cut to a minimum.

Next time you order a power shovel or replacement dipper, specify long life right on your purchase order . . . *specify an Amsco manganese steel dipper.*

American Brake Shoe

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.



toughness... for the roughest screening jobs

CAL-WIC Industrial Screens for the metal mining industry are fabricated of the toughest steels and alloys to give long life and long-run economy. Whether for processing, cleaning, grading, filtering or screening, there is a correct weave, weight and opening. Reduce downtime in your screening operations by installing CAL-WIC Industrial Screens.

Write for further information or for assistance in determining the correct screen for your requirements.

other CF & I steel products for the mining industry

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Heyl & Patterson CYCLONE THICKENERS Can Help You Obtain:

- Recovery of Valuable Material from Wasted Slurry
- Closed Water System Operation
- Sharper Classification
- Closed Circuit with Ball Mills
- Effective Classification before Froth Flotation
- Thickening and Dewatering of Froth Product
- Better Handling of Flotation Tailings
- Improved Filtration
- Low-cost Thickening, Classifying and Desliming

Heyl and Patterson Cyclone Thickeners daily perform all types of thickening, classifying and clarifying operations in the mining industry. In many of these applications the versatile H & P Cyclone has recovered and saved enough material to pay for itself in *one month's time.*

If you're troubled with any type of recovery, thickening or classifying problems, investigate the application of the tested and proven H & P Cyclone in your plant.

Advantages of H & P CYCLONE THICKENER EQUIPMENT

1. Occupies a small amount of space.
2. Has a low initial cost.
3. Needs a minimum amount of maintenance.
4. No moving parts.
5. Power requirements comparable with other thickening equipment.

FOR ADDITIONAL INFORMATION, WRITE FOR BOOKLET CT-32.

Cyclone Thickeners
Thermal Dryers
(The Drying Dutchman)
(Reineveld Centrifugal Dryer)
Thorsten Coal Sampling Systems
Rotary Mine Car Dumpers
Coal Crushers
Coal Preparation Plants
Bradford Breakers

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"SINCE 1887"
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Take it up with Stearns-Roger

Moving into its new Home Office building, designed and constructed by Stearns-Roger to its own requirements, this Company improves substantially its ability to serve a fast-developing America.

In this one L-shaped building (with 90,000 square feet of floor space and capable of future expansion) every modern facility is provided for more than 500 executives, engineers, draftsmen, and office personnel.

Stearns-Roger construction crews are continuously at work on a long list of projects located in many states, the value of which totals many millions of dollars. From its Denver shops, special equipment totalling many trainloads rolls out annually to virtually every state in the Union and to many foreign countries.

For nearly three quarters of a century... the power, mining, metallurgical, chemical, sugar, and gas & oil industries have learned that it pays to "TAKE IT UP WITH STEARNS-ROGER"... whether the requirement is a complete new plant, or enlargement or modernization of existing plants.

Copper Concentrator, located in Southwestern United States, handling 7,500 tons of ore per 24 hours. Stearns-Roger made use of modern methods and equipment to achieve fully automatic operation at every possible point, with a resulting reduction in man power.

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THE STEARNS-ROGER MFG. CO. — DENVER, COLORADO

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The greatest advancement in Industrial Lubrication since Union Oil Company's introduction of the World's first true, Multi-purpose Grease!

Developed here...

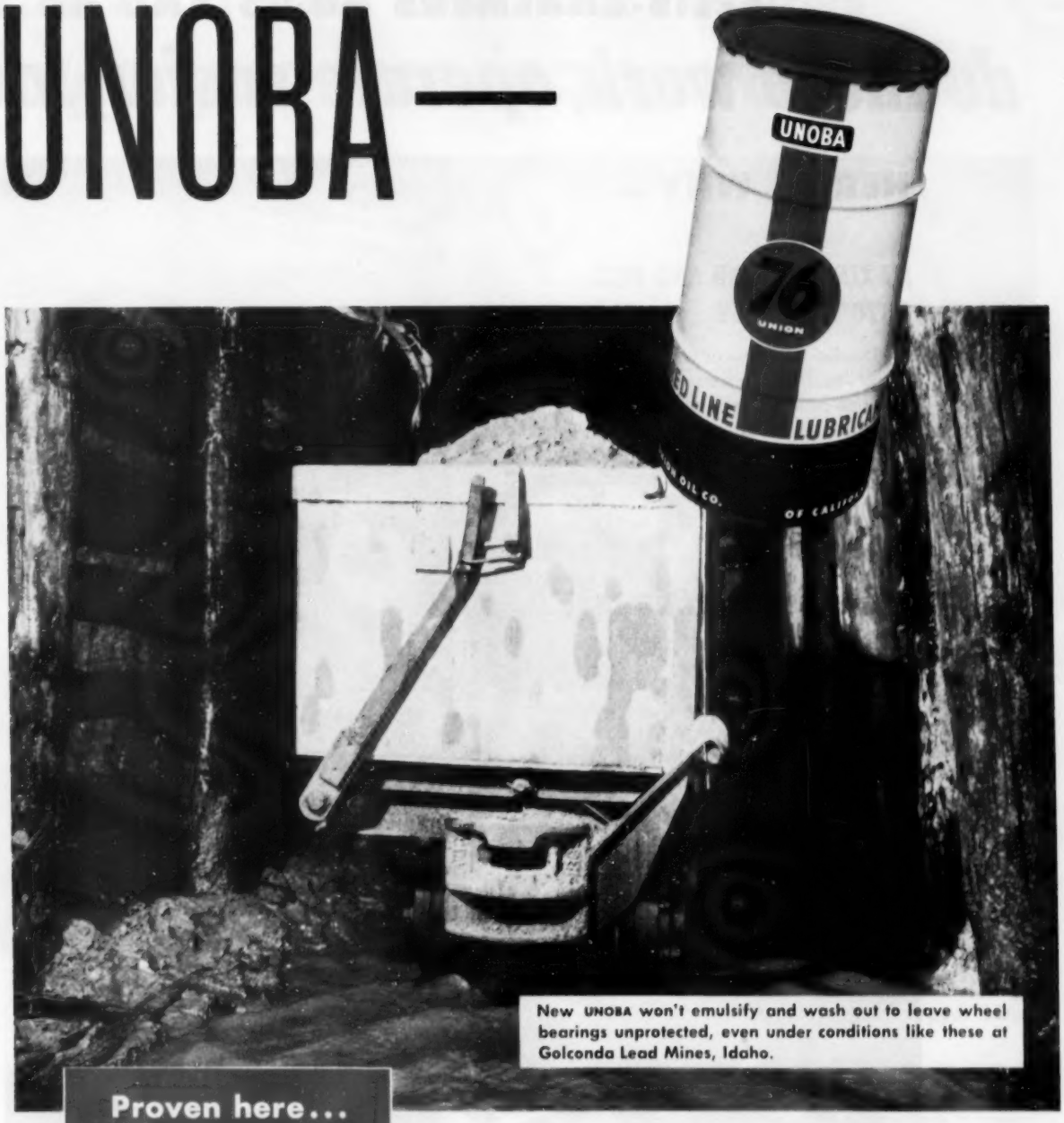
When *New, Improved* UNOBA was first formulated at Union's Research Center, even *our* lubrication engineers found it hard to believe the laboratory test reports. On point after point it proved superior to other multi-purpose greases.

Here's what makes New, Improved UNOBA the finest:

New, Improved UNOBA is made with high viscosity, 100% paraffin base oils... the same oils which are used in Union's finest automotive and industrial oils. When combined with a highly effective oxidation inhibitor, this means greater resistance to hardening even under the severest conditions of friction, high temperature and extended lubrication intervals.

New, Improved UNOBA is compounded with both barium and lithium soap bases... the two finest known. This combination of high V. I., 100% paraffin base oils, oxidation inhibiting agent, and barium-lithium soaps means you get the finest industrial grease available at any price when you specify *New, Improved* UNOBA.

UNOBA—



New UNOBA won't emulsify and wash out to leave wheel bearings unprotected, even under conditions like these at Golconda Lead Mines, Idaho.

Proven here...

Greases, like the equipment they help keep rolling, are proven in the field. To secure conclusive evidence of its superiority, samples of *New, Improved* UNOBA were tested during the past two years in widely varying industrial applications... on almost every conceivable type of machinery and equipment. Results of these field and storage tests from California's Mojave Desert to the Alaskan Arctic... from logging camps in the Cascade Mountains to the Pacific fishing fleets... have more than satisfied Union's exacting product-development men.

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ALLIS-CHALMERS HD-15 AND HD-20

do more work, operate easier, last

HERE'S WHY —

MAXIMUM SPEED AND PULL . . . AUTOMATICALLY

Hydraulic torque converter drive actually multiplies torque up to four and one-half times . . . develops tremendous drawbar pull to start the load smoothly . . . and automatically accelerates to the highest speed that conditions permit.

CUSHIONING EFFECT MEANS LESS SHOCK, STRAIN

Add to this the hydraulic cushioning of the converter that soaks up shocks and vibrations . . . eliminates shock loading on engine, master clutch, transmission and final drives . . . reduces strain and wear . . . provides longer life for both the tractor and its auxiliary equipment.

HYDRAULIC TORQUE CONVERTER TRACTORS

longer, produce increased profit

MORE OPERATOR EFFICIENCY

Operator chooses speed range when he starts and can finish most jobs without further clutching and shifting (except for reverse). Operator works easier, with less fatigue . . . gets more work done per shift. Torque converter drive is a big favorite with operators.

Let your Allis-Chalmers industrial dealer tell you how all these features add up to bigger output, greater profit.

HD-20
175 net engine hp
41,000 lb

HD-15
(with optional hydraulic torque converter drive)
135 net engine hp
28,300 lb

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TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Welding is easy with flexible TIREX

Welding for hours on end puts a terrific "drag" on the operator's wrist. When his wrist tires, his work slows down and so do your profits. With present material prices and labor costs, it's good business to keep production high.

This requires the right welding cable. Welding cables must have characteristics not found in other portable cables. They must be unusually flexible; they must be safe; they must strip clean.

Simplex-TIREX Welding Cable meets all of these requirements. Thousands of hair-fine, closely stranded copper wires permit extreme flexibility. A paper separator over the conductor allows clean stripping and supports the strands.

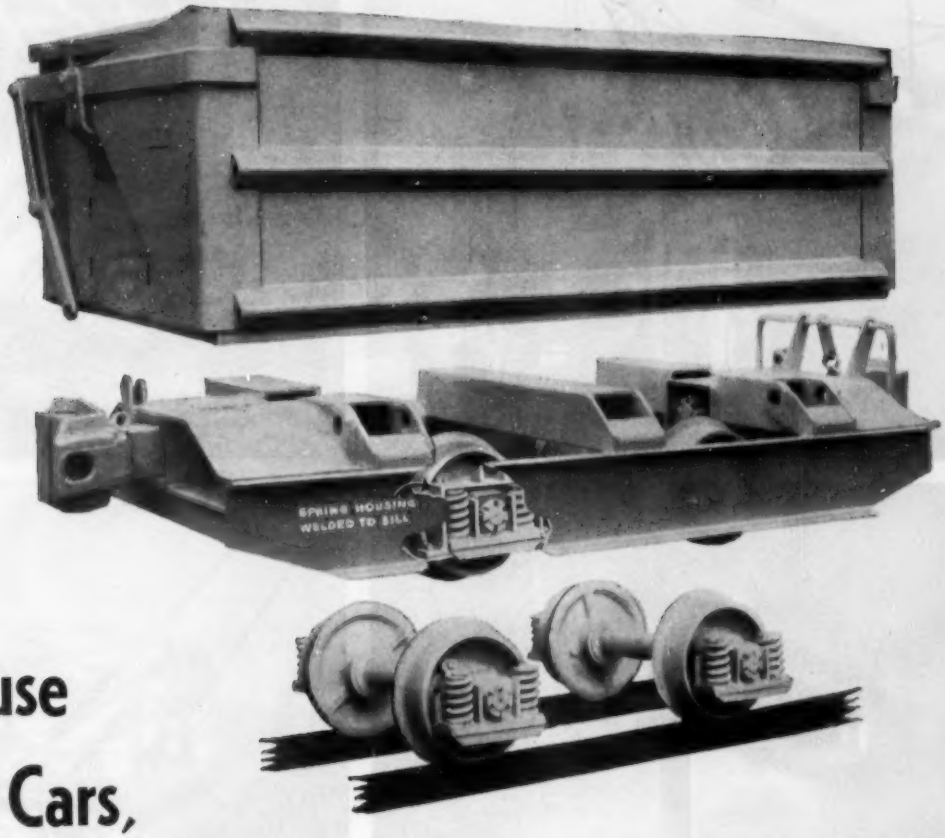
The Selenium Neoprene Armor provides outstanding resistance to abrasion, acids, flame, grease, moisture, and oil. It is not easily cut, and provides insulation with essential electrical stability.

To get more for your money by decreasing "drag" and increasing welding efficiency, buy Simplex-TIREX Welding Cable. For long life, all Simplex-TIREX Cords and Cables are cured in lead. To keep your production and profits at a high level, specify and be sure you get Simplex-TIREX Welding Cable. Your nearest Simplex distributor probably has this tough, flexible welding cable in stock.

Simplex WIRES & CABLES

TIREX CORDS AND CABLES *are made only by the*

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.



If you use Granby Cars, here is information you should have

Gate side of this S-D Granby Car is shown above with body in dumping position and gate open. This particular car was built for a 24" track gauge. The level full capacity is 80 cu. ft. Length inside car body is approximately 9 feet. Width inside is approximately 5½ feet. Size and capacity, can, of course, be varied to suit your conditions.

Here is a new, improved Granby Car. It features: (1) outside frame undercarriage, (2) outside spring truck boxings, (3) automatic coupler mounting, (4) stronger body and (5) all-welded design in which each member serves one or more purposes.

These features offer many advantages. Some are: greater capacity for any specified dimensions because body hinge points are located outside of wheels . . . better trackability and stability on narrow gauges because the low bottom and wide frame give a low center of gravity . . . easy access to all parts of truck and boxing for maintenance because entire axle, wheels, boxings and spring assembly may be dropped out of frame by removal of only eight bolts (see illustration above) . . . maximum shock absorption for any shock or load condition . . . no pinching of bearings . . . no weak spots . . . heavy ¾" bottom plate giving longer life and lower maintenance. Valley angles, gussets, vertical and horizontal stiffeners are used on the body for maximum strength. The all-welded construction is designed so that all joints and connections equal parent metal strength.

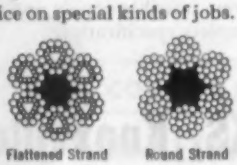
Certainly, this car answers your demands for longer car life and the lowest possible repair and maintenance costs. Let us send you complete specifications.

SANFORD-DAY IRON WORKS, Knoxville 9, Tenn.

PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1, and still tested at higher-than-rated strength. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

Can Flattened Strand solve your special wire rope problem?

Hercules Flattened Strand is a special kind of wire rope that provides extraordinary service on special kinds of jobs.



Flattened Strand Round Strand

The key to the difference is the triangular shape of the strands. Notice how the strands support each other; how the rope circumference is almost perfectly round; and how the core is smaller. There is 10% more steel in Hercules Flattened Strand than in round strand ropes of the same diameter. That means *10% more strength* and *10% greater safety*. Flattened Strand wears longer and more evenly . . . and is easier on sheaves and equipment.

If you can use this Super-rope, you'll soon begin saving time, labor, money. Why not investigate?

Because Leschen pioneered and perfected Hercules Flattened Strand wire rope, Leschen is your best source of additional information. Ask your Leschen man, or write for "The Flattened Strand Story."

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

—Drifts and Crosscuts—

Base Metal Upturn—Three recent developments have given encouragement to base metal producers. The reinstatement of 19 minerals and metals to the DMEA Assistance List on March 23rd can be considered as a first step in Washington in realizing that the mining industry is essential to the national defense and the continued development of domestic resources lessens dependency upon foreign sources of strategic minerals.

The second, and most important, development was the March 26th announcement of President Eisenhower which authorized the "Office of Defense Mobilization to establish, immediately, new **long-term** mineral stockpile objectives." Of greatest significance is the policy "in acquiring the additional amounts to be purchased under the new program, preference will be given to newly mined minerals and metals of domestic origin."

Subsequently, it was announced that the new stockpile program was over and above the existing and authorized military stockpile and that the new stockpile would be of considerable magnitude. Also, that it would be spread over a protracted period of time. It is too early to know what the cost of the program will be but there is hope in Washington that no new funds will be needed as the Congressional authorized stockpiling funds have not been spent or contracted completely.

United States government purchase of 100,000 tons of Chilean copper was the third event of importance. While there still remain at least 80,000 tons of copper in Chile awaiting sale, mine production in that country has been cut about 30 percent. This cut, plus previous United States mine curtailments, brings world supply and demand almost in balance. Significantly, no curtailments have been noted from Africa. Thus the threat of over supply with the inevitable price decline appears to have passed.

Some point out that the expenditure of $60,000,000 for the purchase of Chilean copper has set a precedent and should be more than matched for the purchase of domestically produced metals.

Spokesman for the domestic lead and zinc miners have all agreed that the new stockpiling program is a step in the right direction, but they are almost universally agreed to the fact that it is an "emergency measure" and that it is by no means a permanent solution.

Industry spokesmen have reaffirmed their belief that the only real solution is the "Sliding Scale Tariff" which is essentially the same as the "Elexible Zinc Tariff" first outlined in this section in the November 1952 issue.

Activity Abroad—Copper has the spotlight in the Philippine Islands where construction of the new 4,000-ton-per-day flotation mill of Atlas Consolidated Mining and Development Corporation is well advanced . . . Drilling is continuing at the copper deposit of Elizalde and Company, Inc. at Sipalay, Negros occidental. . . . Reports from the Islands say that it may develop into a 5,000-daily-ton mine. . . The third Philippine copper deposit in the news is that of Sulu Minerals at Port Languyan, Tawitawi Island. . . . Ore is reported high grade with some gold and nickel. . . Exploration is scheduled by the firm.

Treatment Trends—New Jersey Zinc Company's new Fluid Column roasting process has been proved successful after a full year of testing . . . The new process eliminates fine grinding and sintering of sulphide concentrates . . . Flaking or pelletizing of the charge is required before furnacing . . . The new process removes sulphur and improves physical characteristics for the subsequent reduction to metallic zinc . . . The roaster is of simple construction with no moving parts. . . Dust loss is low and all sulphur dioxide is recovered for sulphuric acid manufacture. . . Some metallurgists have indicated that flotation may be the answer to economic recovery of very low-grade uranium. . . Flotation testing of carnotite-type ore is underway. . . One method is to float the uranium-vanadium minerals. . . Another method would be to float out the calcium minerals in the "high lime" type ores which would make acid leaching of the tailing easier and cheaper at a lower cost with a higher uranium recovery.

Exploration—Next to uranium, nickel is the most sought after metal at the moment. . . Continued prospecting is planned for the area east and west of the Mesabi Iron Range in Minnesota. . . Copper and nickel sulphides have been found in the Duluth Gabbro. . . Kennecott Copper Corporation's exploration subsidiary, Bear Creek Mining Company, has a large area under investigation. . . International Nickel Company of Canada also has holdings in the area. . . Several well-known geologists have pointed out the fact that there is plenty of room for development of an important ore body in the area. . . Other geologists have indicated that southern Oregon and northern California should be prospected in light of the Hanna Nickel Smelting Company's plans to electric furnace the garnierites of Nickel Mountain, Oregon which should make similar deposits of economic value.

Alaskan Uranium—Prospecting and claim staking continue. . . Location of some discoveries has been held confidential in accordance with Territorial law. . . The latest released information gives the Brooks Mountain Range as the scene of claim staking. . . Alaskan prospectors have a double incentive for finding and mining the first 20 tons of ore containing 20 percent or more U_3O_8 as the Territorial government will add $10,000 to the United States Atomic Energy Commission's $10,000 discovery bonus.

"Best machines we ever got hold of"

This Caterpillar D7 Tractor is working on a slag pile, 'dozing residue from the smelter mill of Bunker-Hill & Sullivan Mining and Concentrating Co. at Kellogg, Idaho. Equipped with a matching No. 7A Bulldozer, it is also used throughout the plant for clean-up and materials handling. The company, which mines and smelts lead and zinc ores, standardizes on Cat* equipment. They own a D8 Tractor, four D7s, a D2 and a No. 212 Motor Grader.

Even in muck like this, the balanced construction of D7 and No. 7A Bulldozer maintains traction and handles heaping, high-profit loads *fast*. Its factory-built precision is protected against harmful abrasive particles by really *effective* filters, and by engine, track-roller and hydraulic system seals that keep oil and grease *in* and grit *out*.

The Cat-built Diesel Engine remains *carbon-free* throughout the power range — lugging, idling and full speed — on low-cost No. 2 furnace oil. This cuts operating costs — as does the rugged construction of this Caterpillar "team" of tractor and 'dozer. This machine is built to do *more work* at *lower cost* with *less down time* than any other in its class.

Find out for yourself why Geoffery Lyons, superintendent of transportation, Bunker-Hill & Sullivan, says, "Caterpillar makes the best machines we ever got hold of." Your nearby Caterpillar Dealer — who backs his sales with dependable service and genuine factory parts — will demonstrate the Caterpillar-built Tractor and 'Dozer that are *right* for your job.

Caterpillar Tractor Co., San Leandro, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

CAPITOL CONCENTRATES

NEED CLARIFICATIONS ON "NEW LOOK" MINERAL POLICIES PLAN

The "new look" in national mineral policies, announced by the White House on March 26, 1954, has many very interesting implications and needs a good deal of explanation. What seems to be quite plain on first reading is by no means clear after careful study, as frequently is the case with government announcements.

All last year the National Security Council and the Office of Defense Mobilization were busy shrinking many of the stockpile objectives. As a result the Emergency Procurement Service not only was not in the market for more material, but was canceling contracts, where any breach permitted it to do so, in order to recapture the ear-marked funds. The Bureau of the Budget, no doubt, had a great deal to do with this policy. Now, with conditions not observably different, a large-scale expansion of the program is announced. Certainly all this is not being done in order to salvage the zinc-lead industry, though it may have that effect. There were less expensive and less involved devices which could have been invoked. Perhaps the real reasons will become clearer as time goes on.

The new policy is stated to be based upon a preliminary version of the report by the President's Minerals Policy Committee (the McKay report) which is not yet available to the Congress or to the public. No executive orders have been issued to implement the policy, so it is nearly impossible to evaluate it at present.

What, for instance, actually is meant by "long-term" mineral stockpile objectives under the Stockpile Act of 1946? What is meant by "long" and what are the objectives? Can they be pushed up and down by executive order as has been the policy in the past—as was done last year, for example? In other words, just what security does the domestic mining industry have under the new policy?

The mechanics of giving preference to newly mined minerals and metals may present some difficulties. Will contracts be made with major producers and if so at what price? Such contracts could be cost-plus—otherwise they would have to be over-market in most instances to do any good. If the contracts are to be written around a uniform price it is hard to see how windfalls can be prevented. If metal is to be purchased on the open market, how can one distinguish between domestic and foreign, or will it really make any difference?

In order to "reactivate productive capacity" and to "relieve distressed conditions" without using some such device as the floor-price contract or some form of general subsidy (and there is not as much distinction between the two as one might think), an open-market operation to support prices is indicated. At what point will the government get out of the market and how much metal will it be willing to take from all offerers? Certainly a raise in prices will stimulate imports to some extent.

The actual objectives for the National Stockpile always have been kept secret ostensibly for purposes of national security, but some Congressmen have complained that the secrecy also has been for the purpose of manipulating the objectives to cover up mistakes. Be this as it may, it is well known that these objectives are raised and lowered frequently, and often suddenly. It is too much to expect that the National Security Council will permit the objectives to be made public. Are we then to have two stockpiles, one secret and one with published objectives? The domestic mining industry certainly will not be happy without some known time and quantity guarantee.

Is the additional material authorized to be purchased under the new policy above the "minimum stockpile objectives" to be actually placed in the national stockpiles and locked up under the terms of Public Law 520? The White House release is by no means clear on this point even though a superficial reading would indicate this to be the case. If not, we certainly will have, in effect, two stockpiles, one frozen by Congressional mandate, something not easy to change, and the other by executive order which might be a thing of the moment. The provisions of ODM Order V-3 for the sale of materials, surplus to stockpile objectives, may well give one pause. To which stockpile objectives, if we are to have two?

These questions and others posed by the new policy merit careful thought on the part of any mine operator who has any idea of reopening tomorrow. In fact it is not clear when the new look will be put into effect as ODM is first to "review stockpile objectives" and issue directives to GSA, which then will have to get under way, probably through the Emergency Procurement Service. These things generally are not done overnight.

The facts of the matter are that until the "Department of Fuller Explanation" gets into operation and we can study some actual executive orders issued to implement the policy, we can make lots of assumptions but can draw no real conclusions on how it will affect either the economy of the country or the national defense picture. Certainly, the stockpile objectives have been too low and any move to increase them is a move in the right direction.

• *DeSeversky Gives Warning*

In a spectacular bit of testimony before the Malone subcommittee of the Senate, Major Alexander DeSeversky re-emphasized the stupidity of relying upon foreign sources of strategic materials in the case of an all-out war. According to this high authority on military strategy and air power, all our shipping would be swept from the seas immediately and even the vaunted foreign air bases could not be held, excepting perhaps those in Britain. "Therefore, this nation must be prepared to supply its industrial plants from the Western Hemisphere only," DeSeversky said. His advice makes lots of sense and should be taken to heart by those charged with planning for our national security.

• *Does It Mean Buffer Stockpiles?*

The ways of government sometimes are beyond comprehension. Not so long ago, the list of materials for which the Defense Minerals Exploration Administration could issue contracts was cut down. Now the list has been increased by 19 additional materials, including copper, lead and zinc.

FLOW SCHEME SPECIALIST AT YOUR ELBOW

Cyanamid Field Engineers stand ready to work with you in developing the best flow scheme for a new mill or adjusting your present methods to meet changing conditions. They bring you the composite experience gained through similar work throughout the world—plus the latest findings of the Cyanamid Mineral Dressing Laboratory.

Also, a re-study of your ore-dressing methods may show that newer Cyanamid Reagents, alone or in combination with older reagents, may make a worthwhile contribution to better recovery, lower costs or both. You may benefit also by adding Heavy-Media Separation or the Dutch State Mines Cyclone Separator Processes.

To serve your everyday needs, orders for Cyanide, Flotation Reagents and auxiliary chemicals may be placed with our New York office or with American Cyanamid Company, 1440 Broadway, Oakland 12, California; El Paso, Texas; c/o Weicker Transfer & Storage Company, Denver, Colorado; or c/o Goodwin & Mayflower Moving & Storage Co., Spokane, Washington.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA, NEW YORK 20, NEW YORK

OAKLAND, CALIFORNIA • EL PASO, TEXAS

Almost simultaneously the Office of Defense Mobilization predicted "huge surpluses" of some eight materials for 1954 and 1955, including copper, lead and zinc, in the hands of the government. The same week ODM adopted a new policy which will permit the President to authorize the purchase of materials in excess of stockpile objectives. As a result purchase programs may be entered into in order to support the open-market prices of lead and zinc.

Under the new plan there is a considerable danger that if these additional purchases are authorized as being "in the public interest" (note that the phrasing is not in the interests of the national defense) the material may be put in buffer stockpiles instead of locked up in the national stockpiles which can only be released for war purposes. Another policy of ODM reads as follows:

"Where the stockpile objective has been completed and it is determined that the public interest will not be served by transfer to the national stockpile of a surplus acquired under an expansion program, the surplus will be held by the government for eventual disposal. However, such disposal will not be made, either in whole or in part, without clear indication that such action will not have a serious effect upon market prices or create major market fears or uncertainties, and without the prior approval of the President or an official specifically designated by him."

Such policies, not being law, can be changed at will by Executive Order. Industry always has feared the creation of buffer stockpiles which might be used to control market prices for either economic or political reasons, though many first-class economists believe the buffer stockpile plan to be the best eventual cure for the extreme fluctuations of the mineral industry, not only domestic but world-wide. The trends of mineral policy during the next few months will be of vital importance.

• *Dealers In Steel Scrap Want Aid*

The steel scrap dealers are in bad shape these days and are in the market for some sort of government help. Prices of No. 1 heavy melting scrap have dropped from $44 to $25 per ton. Scrap yards have closed, wages have been cut, many of the 200,000 people normally employed in the industry have been laid off and "scrap collecting machinery has started to rust." Aid from the Small Business Administration and government stockpiling are among the suggested cures.

COMING CONVENTIONS

May 24 through 27, 1954. The first SYMPOSIUM ON INSTRUMENTATION for makers and users of instruments for industrial hygiene. University of Michigan Institute of Industrial Health, Ann Arbor, Michigan.

June 20 through July 3, 1954. Centenary Congress of the SOCIETY De L'INDUSTRIE MINERALE, Paris, France.

June 25 and 26, 1954. 1954 PACIFIC COAST REGIONAL CONFERENCE ON CLAYS AND CLAY TECHNOLOGY, Berkeley Campus of the University of California.

September 20 to 24th, 1954. Western Division AMERICAN MINING CONGRESS Exposition, San Francisco, California.

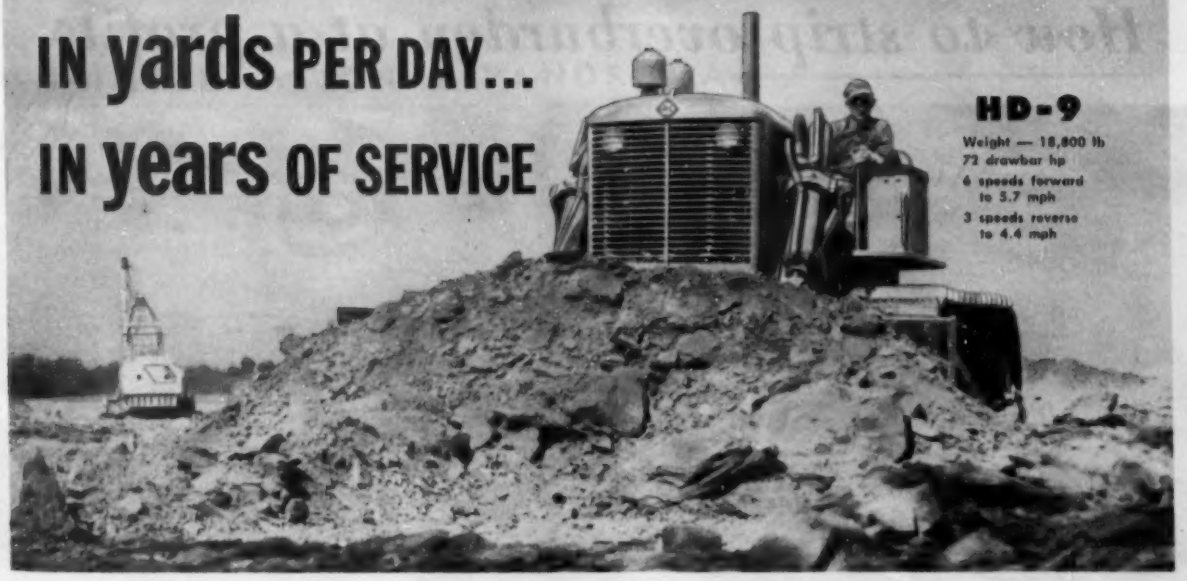
September 24, 1954. Fall meeting MINERALS BENEFICIATION DIVISION AIME, Fairmont Hotel, San Francisco, California.

October 5 through 9, 1954. Annual fall meeting INDUSTRIAL MINERALS DIVISION AIME, Lake Placid, New York.

October 27, 28, 29, 1954. Third NATIONAL CLAY MINERALS CONFERENCE, Rice Institute, Houston, Texas.

HERE'S MINING PRODUCTION YOU CAN MEASURE

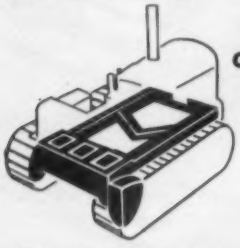
IN yards PER DAY...
IN years OF SERVICE



HD-9

Weight — 18,800 lb
72 drawbar hp
6 speeds forward to 5.7 mph
3 speeds reverse to 4.4 mph

The Allis-Chalmers HD-9 Tractor offers performance reliability and ease of servicing that pays off in year-after-year efficiency.



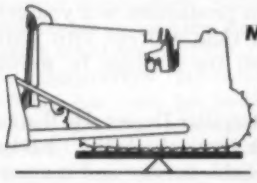
BUILT TO TAKE THE STRAIN OF DAILY USE FOR YEARS...

One-piece, all-welded steel main frame for a continuous, strong backbone that means longer life for each tractor.

Oil-enclosed track release mechanism keeps adjustment at required setting and reduces track maintenance and breakage.

Smooth, efficient power train gives extra life, greater ability to absorb the punishment of rugged jobs for every gear, shaft and bearing in the tractor.

A-type truck frames permit free track oscillation and eliminate strains caused by rough terrain.

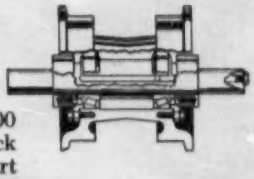


MAXIMUM TRACTION EITHER PULLING OR PUSHING...

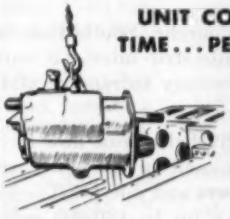
Main frame design reduces tractor overhang at the front of tracks... allows front-mounted equipment to be mounted close to power train for improved weight distribution.

Narrow, strong frame permits wider track shoes for increased stability, uniform track loading for greater traction.

EASIER LUBRICATION SAVES TIME, HELPS PROTECT EQUIPMENT...



Lubrication period of 1,000 hours for final drives, truck wheels, idlers and support rollers saves both time and grease. Positive Seals keep grease in, keep dust and water out. Fewer, more accessible lubrication points make short work of a chore.



UNIT CONSTRUCTION REDUCES DOWN TIME... PERMITS HIGH-QUALITY REPAIRS

Transmission, engine, clutch, final drives and steering clutches — each can be removed independently without disturbing their adjacent assemblies.

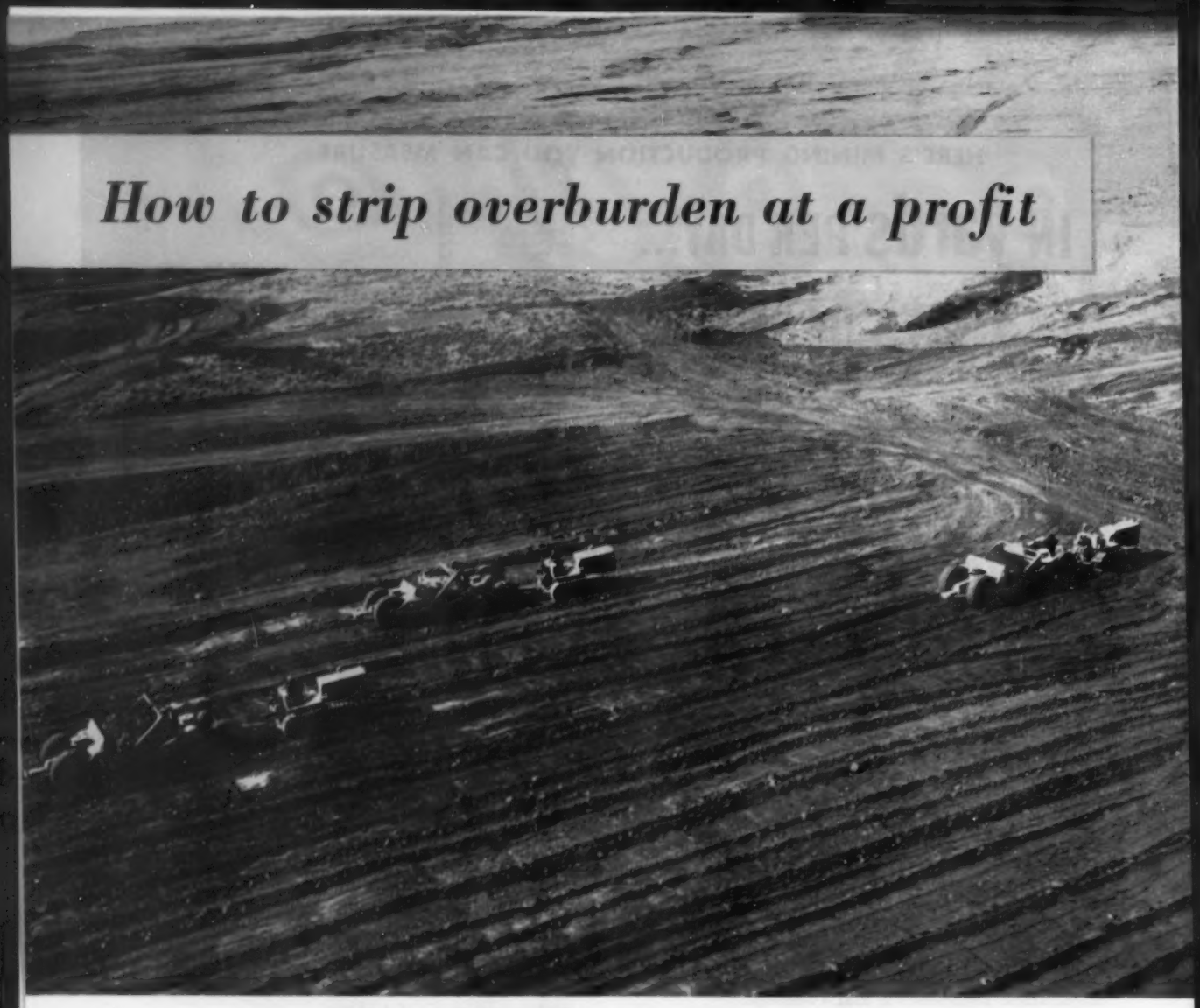
• • •

Let your Allis-Chalmers dealer tell you more about the rugged HD-9 Tractor.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

How to strip overburden at a profit



Twenty miles west of Belle Fourche, South Dakota, Busfield Bros. operate a bentonite strip mine. To reach the 2½-foot bed of clay it's necessary to remove 20 to 25 feet of overburden.

After years of experience, Busfield Bros. now have nothing but Cat*-powered equipment on this job. Three D8 Tractors with No. 80 Scrapers and one D7 Tractor pulling a No. 70 Scraper move up to 180,000 cubic yards of earth per month.

The owners look at Caterpillar machines as a sound investment. Mr. Edwin Busfield says: "We've bought a new D8 and Scraper every spring for the last three years. Profits from their operation enable us to buy additional Cat equipment which we know will last a long time."

A Caterpillar D8 Tractor has the power and traction to top any unit in its class for steady production. And it has the stamina to keep on producing month after month with a minimum of down time. The No. 80 Scraper is its perfectly matched teammate—scientifically designed for fast loading and clean spreading, and ruggedly built for long work life.

When you buy strip mining equipment, *look at your final cost per yard*. How much production will you get in a year? How much down time will cut into your profits? And finally, what will the machine be worth when you're ready to sell it?

Talk it over with your Caterpillar Dealer. He'll give you a demonstration on your own job. And he backs every product he sells with reliable service and genuine parts. Call him today.

Caterpillar Tractor Co., San Leandro, Cal.; Peoria, Illinois, U.S.A.

CATERPILLAR*

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

May, 1954

INTERNATIONAL PANORAMA

TOKYO, JAPAN—Plans have been made for importing 4,960,000 tons of iron ore in the next 12 months. Chief source will be the Philippine Islands with 1,500,000 tons. Other source countries are Malaya 1,350,000, Portugese GOA 800,000, and India 700,000.

MARIETTA, OHIO—First commercial production of electrolytical chromium has been made by the Electro Metallurgical Company at its new plant here. Capacity of the plant is 2,000 annual tons and output is scheduled for jet engines, gas turbines, and rockets.

STOCKHOLM, SWEDEN—Production of iron ore will be raised from 11,000,000 to 18,000,000 annual tons by Trafikaktiebolaget Grangesberg-Oxelosund. The increased output will result from mining expansion at the Kiruna and Malmberget mines.

JAKARTA, INDONESIA—The Republic of Indonesia and the Reconstruction Finance Corporation have signed a contract for RFC to buy 18,000 to 20,000 tons of tin, and tin-in-concentrate, at New York average market prices.

SEOUL, KOREA—The United States government will not renew its tungsten purchase contract with the South Korean government which expired at the end of March.

WASHINGTON, D. C.—World steel ingot production was 254,700,000 tons in 1953. United States output was 111,600,000 tons. Russia and its satellite countries produced an estimated 53,800,000 tons.

LANDER, WYOMING—Prospectors have rushed into the Crooks Gap area and staked hundreds of uranium claims northeast of the Red Desert area where uranium was discovered late in 1953.

MEXICO, D. F., MEXICO—The Mexican government is reported as planning to buy and stockpile Mexican lead and zinc at a combined price of 25 cents per pound.

MONTREAL, QUEBEC—A new and promising discovery of copper mineralization has been reported west of Ungava Bay 900 miles north of here. The discovery was made northeast of the large Quebec-Labrador iron deposits.

LONDON, ENGLAND—The London Gold Market has reopened after being closed for 15 years. Any person will be allowed to sell gold. However, purchases will be limited to persons living outside the Sterling area using dollars or Canadian Sterling. Opening sales were at $34.79 per ounce.

MOAB, UTAH—The United States Atomic Energy Commission has paid $979,800 in new production bonuses to Utah uranium miners. Some 374 Utah mines are eligible to receive bonus payments. Six have each been paid $35,000, the maximum allowable.

NDOLA, NORTHERN RHODESIA—Roan Antelope Copper Mines, Ltd. has formed a subsidiary, Ndola Copper Refineries, Ltd., to build and operate a 60,000-annual-long-ton electrolytic copper refinery here. First electrolytic copper is scheduled for 1958.

WASHINGTON, D. C.—Commissioner Day of the United States Court of Claims has made his findings of fact which clearly lays the groundwork for Court of Claims hearings regarding damages incurred by several United States gold mines because of World War II governmental closings.

KELLOGG, IDAHO—The Vulcan Silver Lead Corporation has proven a high-grade silver ore shoot over a vertical distance of 1,000 feet, a length of 500 to 700 feet, and a width of 6 feet in its Vulcan mine.

TORONTO, ONTARIO—Pronto Uranium Mines Limited has allocated $1,500,000 for underground mine development and equipment for a 1,000-ton-per-day operation.

LAKELAND, FLORIDA—The United States Geological Survey has completed a 5,600-mile airborne radioactive survey of 10 Florida areas. Abnormal anomalies indicating high radioactivity were recorded in eight.

BARTOW, FLORIDA—International Minerals & Chemical Corporation has started its new byproduct uranium plant here. Over 60 tons of overburden and phosphate rock must be handled to recover one pound of U_3O_8 at the plant.

Titanium Sponge Prices Reduced by du Pont

Price reduction of 6 and 11 percent for ductile titanium metal sponge have been announced by the E. I. du Pont de Nemours and Company, Wilmington, Delaware.

New prices, effective since April 1, are $4.72 per pound for Grade A-1 sponge containing a maximum of 0.3 percent iron, and $4.46 for Grade A-2, containing not more than 0.5 percent iron. The reduction is the first price cut for this form of the metal since du Pont began producing it commercially in 1948 from its pilot plant at Newport, Delaware.

The reduction was made possible by improvements in process and expansion of manufacturing capacity, a company spokesman said. Du Pont has been spending $1,000,000 yearly for titanium research and expects to reach a daily production of 10 tons per day by mid-year.

Potash Company Forms Canadian Subsidiary

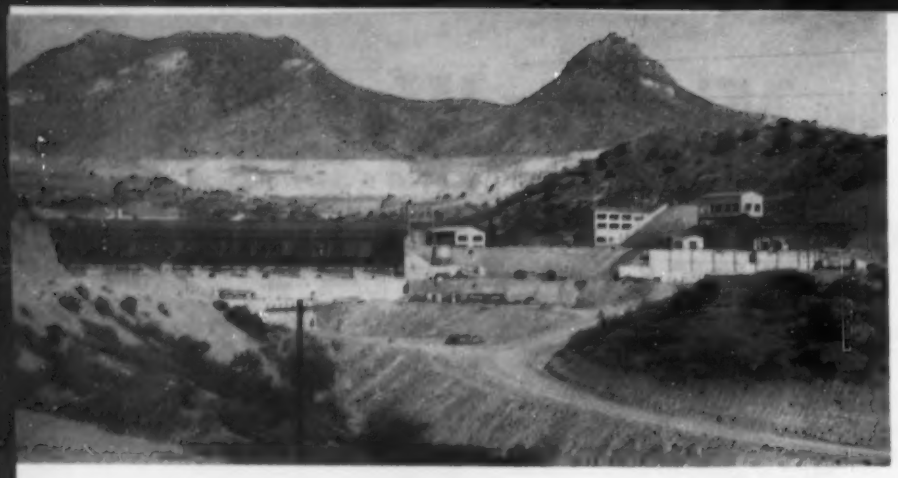
Potash Company of America has formed a wholly owned Canadian subsidiary, Potash Company of America, Ltd., to continue exploratory work in Saskatcheman which has been going on for the past two years. The present program includes additional drilling under a prospecting permit with the objective of developing a favorable shaft site.

The company plans to sink an exploratory shaft if the suitable site is found, and to go ahead with plant construction and production if an ore body is developed.

Potash has been carrying on its Canadian operations, as well as explorations east of its Carlsbad, New Mexico mine and the plant, to develop additional ore reserves. Any new production in Canada would be an adjunct to and not a replacement of the Carlsbad operations. Under the most favorable conditions, it would be several years before any production would come from Canadian property. This apparently conforms with the present market conditions in which potash production is in excess of demand.

ATTENTION
Uranium Miners

Persons locating uranium mining claims on land affected by the Mineral Leasing Act wherein the claims were staked between January 1, 1953 and February 9, 1954 must file with the United States Atomic Energy Commission an application for uranium mining lease under the provisions of Circular 7 on or before May 31, 1954.



COPPER CITIES from Castle Dome is the biggest switch in southwest copper mining. The 12,000-ton flotation mill and all mine equipment have been moved 15 miles. Progress in mill rebuilding with open-pit mine in the background.

Castle Dome Becomes Copper Cities In Synchronized Mine and Mill Transfer

Castle Dome depletion and abandonment carefully meshed with Mine stripping and mill construction at Copper Cities 15 miles away

After four years of detailed planning and accurate timing, Miami Copper Company is making a well-coordinated move of mining and milling facilities from its depleted Castle Dome Copper ore body to the new Copper Cities project soon to be operated by its subsidiary, Copper Cities Mining Company. Production will begin this fall at the Copper Cities open pit, located three miles northeast of Miami, Arizona.

Careful synchronization has geared stripping and preliminary construction work to coincide with the shutdown of Castle Dome. As stripping ratios decreased at Castle Dome and equipment became surplus, men and facilities were transferred to Copper Cities to accelerate work already underway. The overall plan involves moving a 12,000-ton plant, 52 pieces of mining equipment, and personnel from Castle Dome to Copper Cities, a distance of 15 miles, with a minimum of lost time and production.

Synchronizing development stages at the new operation with depletion of the Castle Dome project benefited both labor and management. Job layoffs were held to a minimum and employees therefore suffered no lost time nor loss of benefits. The company, at the same time, was able to retain an experienced working crew intact and utilize existing facilities with no additional outlay for plant expansion. The Company believes that the move will result in a better mill crew, because operators will become more familiar with the equipment in actually dismantling, transferring, and reassembling it at Copper Cities. Mining and milling operations at Castle Dome ended on December 5, 1953. The following day employees began the huge task of stripping machinery from the concentrator, and moving it to the new site. Mill equipment was moved out by January 18, and the National Steel and Construction Company of Phoenix began work on dismantling the mill building and moving it to Copper Cities where they are re-erecting it.

Castle Dome Summary

The Miami Copper Company, through the purchase of some adjoining claims in 1940, became interested in the Castle Dome group then held by the Pinto Valley Development Company. Surface geology and exploration indicated a considerable ore body underlying the area. In 1941, Miami Copper purchased the property, and carried on a drilling program. Following negotations with the Defense Plant Corporation, a contract for stripping and plant construction was awarded to the W. A. Bechtel Company in January 1942. Overburden was stripped and the plant constructed in near-record time. Castle Dome took over the mine from the contractor April 19, 1943 and the 10,000-ton mill in June. Later, by using grate discharges in the ball mills and automatic feed controls, the mill capacity was boosted to 12,000 tons per day. In 1948, the 30,000,000-ton Castle Dome ore body was augmented by 6,000,000 tons of reserves from the adjoining Red Hill deposit. The life of the Dome open pit was extended somewhat by mining two levels deeper than originally planned. A total of 41,442,617 tons of ore were milled with an over-all recovery of 12.408 pounds of copper per ton of ore. See Table No. 1.

Operating Personnel

R. W. Hughes	Vice President, General Manager
B. R. Coil	Assistant General Manager
J. W. Still	General Superintendent
J. H. Gray	Mine Superintendent
R. L. Mountjoy	Mill Superintendent
M. M. Stover	General Mine Foreman
C. C. Webb	Project Superintendent
John Thames	General Construction Foreman
R. P. Hughes	Master Mechanic

Background—Copper Cities

Almost identical in tonnage and grade with the original Castle Dome ore body, the Copper Cities project dates back to some long-range thinking and consolidation of Miami's holdings with the Porphyry Reserve Group in 1941. The deposit is a typical low-grade dissemination of chalcopyrite and chalcocite in quartz monzonite and quartz monzonite porphyry. It is bounded on three sides by faults—to the north the Drummond, on the south the Coronado, and the Sleeping Beauty series cuts it off on the west.

Financed in part by an RFC loan, the project will represent a total

investment of about $15,000,000. The General Services administration has agreed to buy, at 23 cents, (subject to escalation) a maximum of 170,000,000 pounds of the first 192,500,000 pounds of copper produced if the company is unable to market it at that price or better. Ore reserves total 33,000,000 tons and total waste will amount to 35,000,000 tons. Twenty million tons of overburden must be moved to place the property in production. By April of this year 16,000,000 tons had been removed.

Exploration

Exploration at Copper Cities was started during World War II, but operations were hampered by a lack of manpower and activities were halted. Following an increase in the available labor supply, the company returned to the drilling program early in 1946. Bucyrus Erie 22T gasoline-powered churn drills were used and holes were drilled on the corners of a 250-foot grid system. Holes averaged about 600 feet in depth and were collared with a 10-inch bit and usually finished with a 6-inch bit. Sludge samples were taken for 5-foot intervals by passing all the churn drill cuttings through a splitter which made a one-sixty-fourth cut. The resulting sample was further reduced to 15 pounds by a Jones sampler, dried, and assayed. Holes were cased from top to bottom to prevent salting. Drilling was contracted at first, but the company felt that in working with such a low-grade ore body, it was best to sacrifice speed in order to obtain accurate samples, so the major portion of the drilling was done with company forces. Cut-off grade is 0.4 percent copper; average grade of the deposit is 0.7 percent. Casing costs were low, since 96.0 percent was recovered and used again in subsequent holes.

Mining Equipment—Copper Cities

SHOVELS:
- 3 Marion, model 4161, electric shovels, 5-yard
- 2 Northwest Diesel shovels, 2½-yard

HAULAGE:
- 8 Knuckey 30-ton, with 150-horsepower Cummins Diesel engines
- 5 Knuckey 30-ton, with 275-horsepower Cummins Diesel engines
- 5 Kenworth 30-ton, with 275-horsepower Cummins Diesel engines
- 2 Euclid 35-ton, with twin 190-horsepower Cummins Diesel engines, and equipped with Allison torque converters and torquomatic transmission
- 4 Euclid 15-ton trucks

DRILLS:
- 7 Bucyrus Erie 29T churn drills, 9-inch hole, electric
- 3 Bucyrus Erie 22T churn drills, gasoline-driven

MISCELLANEOUS:
- 11 Caterpillar D8 bulldozers
- 2 Road graders

POWDER:
- LDX 705 free flowing bag powder
- Apache 40 and 60 per cent gelatin cartridges, 8- by 18-inch

In 1949 the Fairchild Aerial Survey Corporation made a survey of the property, and prepared a 1-inch to equal 40-foot scale topographic map of the area. All cut and fill work for crusher and mill foundations, stripping tonnages, areas for waste dumps and road fill were calculated from the map. This aerial survey was made when a shortage of engineers existed, thereby releasing company men for other jobs.

Stripping Castle Cities

Stripping began with two 2½-yard Northwest Diesel shovels and four Euclid 15-ton trucks in January 1951. In May of that year eight Knuckey 30-ton trucks powered with 150-horsepower engines were transferred from the Castle Dome open pit to the Copper Cities project. During the latter stages of mining at Castle Dome and Red Hill, these trucks were found to be under-powered for the eight percent grades encountered as the lower limits of the pit were approached. They could, however, be used to advantage at the new operation for hauling overburden since grades were relatively flat and favored the load in many cases. By July 1951, one of the Marion 5-yard shovels was no longer needed at Castle Dome and was moved to Copper Cities. It took about three weeks to dismantle the shovel and put it back in operation at the new site. Stripping initially began at a rate of 200,000 tons per month, and was gradually stepped up to 500,000 tons per month with the addition of more haulage units near the end of 1951. After the termination of mining operations at Castle Dome, all the mining equipment was transferred to Copper Cities. Stripping is currently proceeding at a rate of 800,000-tons per month, with the operation of five Marion shovel shifts per day, six days per week.

The mine is laid out with 45-foot benches. Blast holes are drilled with Bucyrus Erie 29T churn drills using a 9 inch bit. Holes are spaced on 24-foot centers, and are bottomed 5 feet below grade. Burden at the toe of the hole averages 40 to 45 feet. In drilling, the first 6 or 7 feet of hole must be cased. During the early stages of stripping, and before a power line had been completed,

MACHINERY FOR A 12,000-TON copper flotation mill looks like this when it is all dismantled and piled separately. Note the crusher frames, mantles, and ball mill shells are placed to facilitate moving.

LEFT: Trucks will dump ore directly into this concrete-lined ore pocket. A series of 10-inch churn drills on 7-foot centers were sunk to bedrock and filled with concrete to form foundation for apron at top of pocket.

RIGHT: This Knuckey 30-ton truck dumps a load of waste from mine stripping to form part of the fill for the access road to the primary crusher from the mine. Several open-pit benches are visible at right.

the company used the gasoline-driven Bucyrus Erie 22T drills. Since placing the 29T in operation, footage per drill shift has increased 57 percent from 66 to 104 feet.

Blasting practice in overburden has varied quite widely with conditions, but each hole generally is loaded with two 8- by 18-inch cartridges of either 40 or 60 percent gelatin dynamite; LDX 40 percent free-flowing bag powder is placed above this. Two plain primacord lines attached to the bottom cartridge are connected to a trunk line; No. 6 electric blasting caps are attached to each end of the trunk line and the holes are fired simultaneously. Holes are stemmed with screened gravel. The actual load per hole is calculated by the drilling and blasting foreman. Powder factor varies from ⅜ to ⅝ pound per cubic yard. The ground breaks fine and very little secondary blasting must be done. The haul roads to the primary crusher are currently being built by dumping waste obtained from stripping operations at the mine. Pit roads to waste dumps and to the coarse ore pocket at the mill are planned to provide a maximum downgrade of five percent and a maximum upgrade of eight percent. A grader, sprinkler truck, and Caterpillar D8 bulldozers are used for road maintenance. Pit roads are kept in excellent condition and contribute much to the efficiency of the operation.

Castle Dome Concentrator Summary For 1953

	Pounds per Ton of Ore
REAGENT CONSUMPTION:	
Sodium aerofloat	0.050
Pine oil	0.126
Lime	3.60
STEEL CONSUMPTION:	
Grinding balls	1.92
Ball mill liners	
Manganese liners	0.012
NiHard liners	0.099
Cast iron liners	0.007
POWER CONSUMPTION:	
Kwh per ton of ore	14.283
WATER CONSUMPTION:	
Reclaimed (gallons per minute)	5,187
(gallons per ton of ore)	635
Fresh (gallons per minute)	947
(gallons per ton of ore)	116
WATER RECOVERY:	81.7 percent
TONS MILLED PER MAN SHIFT:	71.7
GRIND OF BALL MILL FEED:	
Plus-48-mesh	15.0 percent
Plus-65-mesh	15.8 percent
Plus-100-mesh	13.2 percent
Plus-200-mesh	9.2 percent
Minus-200-mesh	38.7 percent

Preliminary Mill Construction

Evacuation for roads and the plant building foundations started in 1951. Since that date, the company has poured an average of 1,000 yards of ready-mixed concrete per month, and as of the first of the year 24,000 yards of concrete had been placed. With the exception of a change in the location of the Symons standard crushers the new plant will be practically an exact duplicate of the Castle Dome unit. Foundations were designed from measurements and plans used at Castle Dome. New steel frame housing was erected for some of the crushing units. At Castle Dome the 66- by 84-inch primary jaw crusher was located underground and fed from a glory hole. Three-stage crushing was employed and Symons standard and Symons shorthead crushers were housed in one building. This required a 2,350-foot conveyor belt to gain the 190-foot height required to house the two secondary crushing units. At Copper Cities, the standard and shorthead crushing steps will be installed in different buildings, eliminating the long conveyor and simplifying belt maintenance and repair.

Therefore it is planned to cut the belt in half, splice each half, and make two conveyors at Copper Cities for the crushing units. Copper Cities Mining Company excavated and poured the crusher foundations and erected the steel frame housing for the crushers. The jaw crusher in the primary crusher building is fed from a 1,500-ton concrete pocket. Waste fill around the pocket will provide ample room for turning and

Castle Dome Operation Summary

Milling started	June 10, 1943
Milling Completed	December 5, 1953
Grade of ore	0.725 percent copper
sulfide	0.689 percent
oxide	0.036 percent
Tons of ore milled	41,442,617
Pounds of copper recovered	514,228,204
Net recovery	12.408 Pounds per ton
Tons of waste handled	48,484,188
Stripping ratio	1.169 to 1.0

dumping the trucks. The fine ore bin at Castle Dome, built during World War II when steel was hard to get, was of reinforced concrete. Thus it was necessary to design and construct a new bin at Copper Cities. The 15,000-ton bin is of suspended catenary, steel construction.

Re-erection of the Castle Dome mill building at the new site was scheduled for completion about mid-April 1954, after which company men will begin installation of equipment now stored on the Copper Cities waste dump.

New Tailing Dam

One of the 2½-yard Northwest shovels was transferred to the site for the tailing dam after the Castle Dome concentrator was shut down. The tailing area consists of three adjoining gulches which will be dammed with earth fill picked up by the shovel and loaded on 15-ton Euclid trucks. Fill will be built up to a height of 80 feet and cuts will be made in ridges to interconnect the gulches and prevent washouts in case of flash floods. The dam will be further built up by mill tailing discharged progressively across the face of the dam from a wooden trestle near the crest of the dam. Tailing will slope back from the face of the dam to create a pond. Provisions for reclaiming water from the area are planned, and will be similar to the system used at the Castle Dome tailing dams. Tailing will eventually cover the ridges between the gulches to provide one continuous storage area. Recovery of water used in the mill circuit at Castle Dome amounted to 81.7 percent and 947 gallons per minute of fresh water were required. Since the Copper Cities project will be practically a twin of Castle Dome, it is reasonable to assume that similar requirements will prevail.

15,000 ton fine ore bin will feed seven 10′-6″x11′ grate discharge ball mills in closed circuit with 12- by 28-foot Dorr FX Classifiers. Bin shown above with foundation for grinding section is of suspended catenary design.

Fresh Water

Fresh water will be supplied from two sources, one of which is the Old Dominion mine near Globe. Water is pumped from the mine shaft to the Copper Cities pumping plant at Burch. The second source comes from a water development across the Miami Wash at Burch. An 8- by 8-foot shaft was sunk 190 feet to solid conglomerate below the water-bearing sands, and a drift was driven westerly under the dry wash. Churn drill holes were drilled through the sands into the drift, and were cased with perforated stainless steel pipe. Water is collected in the drift and pumped with three deep well pumps from the shaft to a water treatment plant. Water will be pumped from the Burch pumping station by three Byron Jackson pumps, rated at 750 gallons per minute, to the 3,500,000-gallon mill storage reservoir, located at Copper Cities.

Moves Concentrator Equipment

Mill and repair crews reporting to work on December 6, 1953 began the huge task of removing equipment and machinery from the foundations at Castle Dome and hauling the parts to the Copper Cities site. The first step was to strip concentration equipment from the building and

LEFT TO RIGHT: John Gray, mine superintendent, supervised transportation for the move to Copper Cities. John Thams and M. M. Stover, (center) are, respectively, construction superintendent and mine foreman. R. L. Montejoy, mill superintendent at Castle Dome, will take charge of the Copper Cities concentrator.

Foundations for grinding and flotation section are shown in center. Symons shorthead crushing unit is in foreground.

move it outside as soon as possible so that National Steel and Construction could begin dismantling the building and structural steel. By January 18, the crew had removed the mill equipment and National Steel and Construction men started to work. Building cranes were used to pick up machinery and position it for removal.

For loading equipment, the company had two rubber-tired Lorain mobile cranes; capacity of each crane was 15 tons. They also converted two small shovels to aid in the job. A 1½-yard Lorain shovel was equipped with an 80-foot boom and another ⅝-yard shovel was fitted with a 50-foot boom. Two 18-ton Fruehauf concentrate trailers were converted to flat beds, and with one Ball trailer and a 10-ton Kenworth truck equipped with a flat bed, formed the haulage units. Prime movers for the trailers were two Mack tractors with 200-horsepower Cummins Diesel engines and an Autocar tractor with a 150-horsepower Cummins Diesel engine. This fleet was supplemented by a 60-ton low boy unit and two flatbed trailers furnished by W. M. Cecil, a local contractor. Overload permits were obtained from the Arizona State Highway Department who cooperated fully in the moving project and directed traffic where necessary. Equipment was moved to Copper Cities on week days only. Total haul from Castle Dome to Copper Cities was 15 miles, of which 12 miles were paved. The maximum pitch was 1,000 feet of 12 percent grade and ¾ mile of eight percent grade. The longest items moved were the secondary crusher building columns which were 66 feet in length, and the heaviest pieces were the ball mills which were moved intact after end shells and grates had been removed. They weighed approximately 45 tons each. As machinery was taken apart, it was marked for identification and reassembly purposes. Six weeks were required to remove and transport equipment to the Copper Cities waste dump where it is stored in the open. Motors and starting panels were kept under cover in one of the warehouses at Castle Dome. Equipment stored at Copper Cities was placed on cribbing and is ready for re-loading when installation begins at the Copper Cities mill site. When ready, crews will merely place jacks under the piece, remove the cribbing, and back the truck under the unit. Mill and repair crews are busy repairing and overhauling equipment on the dump, and all machinery will be thoroughly reconditioned by the time National Steel and Construction finishes erection of the mill building.

Stripping Data—Copper Cities Open Pit—1953

CHURN DRILLING:	
Bucyrus Erie 29T	
Feet drilled per churn drill shift	104
Feet drilled per bit change	108
Bucyrus Erie 22T	
Feet drilled per churn drill shift	66
Feet drilled per bit change	72
ROCK BREAKING:	
Tons broken per pound of powder	4.64
Tons broken per foot of hole	73.28
MINING:	
Tons of rock per shovel shift	6,302
HAULAGE:	
Knuckey 30-ton, 150 horsepower engine	
Average round trip (miles)	0.97
Tons hauled per truck per trip	30.97
Tons hauled per truck per shift	927.8
Ton miles per truck per shift	452

The company finished moving mill equipment about the middle of February which left a period of about two months for making repairs before placing it on foundations. Moving of the plant is now 90 percent complete. Items remaining to be moved are the warehouse building, miscellaneous small buildings, machine shop, and bit shop.

Through masterful planning and careful timing, Miami Copper is completing a switchover in operations utilizing existing equipment and supplies which is unique in the mining industry. This will result in more copper from ore of an ever lowering grade—a notable achievement in the mineral industry.

LEFT: Panoramic view of the new Copper Cities open pit. First copper ore production from this pit is scheduled for the fall of 1954 using all mining equipment from the Castle Dome mine which was depleted in December 1953. RIGHT: A Marion 4161 electric shovel loading waste on a Kenworth 30-ton truck. Much of the waste now being mined is used for fill on ore haul road to the course ore pocket.

LECTROMELT 7,500-KVA ELECTRIC furnaces smelt the charge at Pioche Manganese. Electrodes and balanced swivel feed spouts are shown at top of furnace.

Pioche Makes Ferromanganese In New Electrolytic Furnace Plant

By Stanley Dayton
Field Editor
Mining World

The Pioche Manganese Company's ferromanganese plant, another enterprise in Southern Nevada's growing metallurgical industry, reached full production early this year with the installation of a second electric furnace This was the culmination of 20 years of research and growth carried on by the Combined Metals Reduction Company, Pioche parent company, to fully utilize the ores found and mined by Combined Metals at Pioche, Nevada.

The Process

Manganese concentrates produced from the highly complex manganosiderite zone of the lead-zinc ore bodies of the Pioche district in Nevada, are calcined and nodulized in a rotary kiln at Caselton, Nevada.

The nodules are shipped by rail to Henderson, Nevada, where they are mixed with crude ores, coke and lime (the latter if necessary) by a series of belt conveyors and charged to two 7,500-kva electric furnaces. The arc produced between six carbon electrodes and the carbon-lined hearth of each furnace provides the heat necessary to melt the charge and start the chemical reactions. Iron and manganese are reduced by the coke in the charge, while the lime combines with siliceous impurities to produce a Mono-silicate slag. Metal and slag are tapped into trays; cooled for 24 hours; slag barred off, and the metal broken into lumps varying in size from 3 to 8 inches. The ferromanganese is stockpiled for later shipment at a loading dock located adjacent to a railroad spur.

The Use

Ferromanganese is used as a scavenger in open hearth and Bessemer furnaces in the course of converting iron ore to steel. It is added to absorb sulphur, phosphorus and oxygen, and each ton of steel produced requires from 15 to 20 pounds of manganese to cleanse the molten iron of deleterious elements. Some low carbon forms of ferromanganese are used for alloying purposes in steel making.

Plant Acquisition

The Pioche Managanese Company's furnace operation occupies one unit of the former Basic Magnesium Industries plant site at Henderson, Nevada. The $140,000,000 BMI plant

LEFT TO RIGHT: Loyal S. Phillips, plant superintendent. F. B. Petermann, assistant general superintendent, calculates the furnace charge. James F. Orr, general superintendent of Pioche Manganese Company's operations.

MELT IS TAPPED from the furnace every three to four hours into a series of cascading trays.

turned out some 165,000,000 pounds of Magnesium during the war but was shut down in 1944; the installation then reverted to the Defense Production Authority.

In 1948, after some far-sighted thinking by several individuals, the Nevada Colorado River Commission, acting as agent for the State of Nevada, acquired the plant and town site for $24,000,000 with the understanding that the Commission would dispose of it to private industry within five years. Several concerns, among which were the Western Electro-Chemical Company, Stauffer Chemical Company, United States Lime Products Company, and the Titanium Metals Corporation of America were soon attracted to the area. An existing town site, roads, a large electro-chemical plant, and a source of cheap power from Hoover Dam located 16 miles away were the inducements.

The Combined Metals Reduction Company entered the picture in 1949 when it acquired one unit of the former BMI plant.

Research on Milling Methods

Combined Metals for years had done extensive research on methods of concentrating ore contained in its complex deposits near Pioche. On the periphery of the lead-zinc replacement deposits were zones containing a high manganese content with some lead and zinc values. Iron and manganese carbonates in this zone occurred in intimate mixtures and approached the form of manganosiderite. Milling methods were worked out whereby this portion of the deposit could be concentrated. The flowsheet involves pre-concentration in a heavy media plant, followed by successive flotation of lead sulphides, zinc sulphides, oxide lead, and iron sulphides. Tailing from the iron sulphide section is treated by flotation to recover the manganese content.

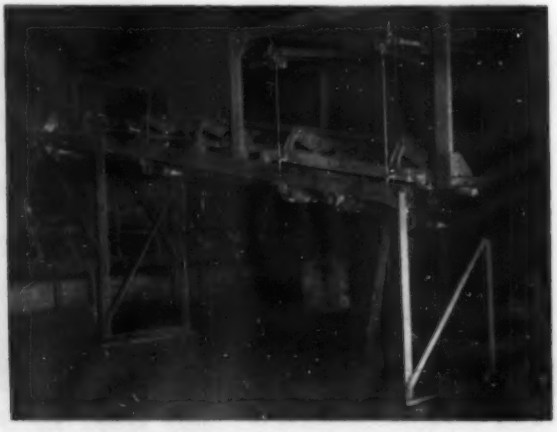
Combined Metals organized a subsidiary, Pioche Manganese Company, in 1951, and in the following year completed a third unit at the existing Caselton mill to concentrate the manganese-lead-zinc ores. In 1952, the Pioche Manganese Company constructed a rotary kiln near the Caselton site to calcine and nodulize manganese concentrates.

Ores of the Pioche district vary quite widely in composition, from siliceous to carbonaceous. By blending of concentrates in the kiln or by adding small amounts of flux to the kiln feed, nodules which are nearly self-fluxing are produced. The nodules produced at Caselton are stockpiled for later shipment to Henderson.

Following acquisition of the section of the BMI plant at Henderson, Pioche Manganese began the construction of conveyors and bins to handle the furnace charge. The roof of the old BMI unit had to be raised 29 feet to provide the necessary headroom for a bridge crane and conveyors over the furnaces. Two carbon-lined, Lectromelt, six-electrode, 7,500-kva furnaces were installed and the first metal tap was made June 25, 1953.

Charge Mixed on Belts

Nodules, ore, flux, and coke are dumped separately into a 120-ton track hopper. Normally material removed from the track hopper travels by a 24-inch conveyor system to one of four 500-ton storage bins; one bin is used for nodules, another for flux, a third for coke, and the fourth for ore which has not been nodulized. Ore and nodules are sampled while enroute to the storage bins. A series of four parallel cross conveyors equipped with variable-speed motor drives, remove the charge components from the storage bins and transport them to a gathering belt placed at right angles to the discharge ends of the cross conveyors. Through this arrangement, the



LEFT: Tap trays are fitted with lugs for handling by over-head crane. RIGHT: Charge is mixed by conveyor belts. This belt transports coke from one of the storage bins to a gathering belt shown in the background.

charge is laid down on the gathering belt in layers, ready to be fed to charge bins over the two electric furnaces.

Charge Calculation

Honeywell controllers and recorders are used to vary motor and conveyor belt speeds. F. B. Petermann, assistant general superintendent, calculates the charge for a specific batch of nodules and ore, and translates the data into speed and rate settings for the Honeywell controller. This information is handed to the operator who then makes the proper settings. Recorders and Merrick Weightometers check the flow of charge materials, and operators can make minor adjustments of bin gate settings to provide the proper furnace charge. The furnace charge is calculated to make a slag with an approximate one-to-one lime-to-silica ratio.

The charge on the gathering belt is dropped by trippers into hopper bottom bins feeding the furnaces. There are 10 bins per furnace and total charge storage is 180 tons per furnace. For flexibility of operations, one hopper is usually kept empty so that if adjustments in the charge are required during a melt they can be made immediately by adding the necessary component to the empty bin. Swivel spouts at the bottom of each hopper feed the charge to the furnaces.

Henderson Furnaces

Each of the furnaces, measuring 9 feet 9 inches by 34 feet 9 inches inside dimensions, is equipped with six electrodes, 110 inches in length by 30 inches in diameter, arranged in a straight line and spaced on five-foot centers. Three 2,500-kva single-phase transformers, each connected across two electrodes, serve each furnace. The electrodes are counterbalanced and the electrode level is raised or lowered automatically to find the proper resistance depending on the power input to the furnace. Power consumption is approximately 3,000-kw hours or less per long ton of metal produced. Capacitors on the main line increase the power factor by as much as 15 percent. Power factor at the electrode is around 80 percent. Suspension clamps on the electrodes, along with the one-inch steel furnace tapping jacket, are water cooled. Furnace temperatures range in the neighborhood of 3,000° F. for production of ferromanganese. The capacity of each furnace is 50 long tons of metal per day.

Tapping

The furnace linings are built up with quartz sand, fire brick, and fire clay. The hearth, 30 inches in depth, is lined with a 30 inch thickness of carbon blocks. Inside the furnace there would appear a 10- to 15-inch bath of metal and slag, above which is unreduced charge extending to the top of the furnace. Immediately after a tap, the charge slumps down into the hearth, and more material is added from the hoppers above the furnace.

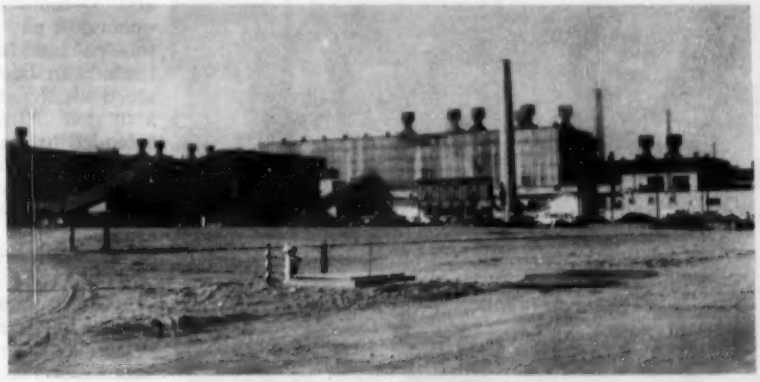
Manganese recovery runs 80 to 85 percent; approximately 5 percent of the metal is lost by volatilization, while the remaining metal is taken up in the slag.

The furnace tap holes, 3 inches in diameter, are in a 9-inch-diameter graphite insert placed in a 24- by 24- by 36-inch carbon tapping block. Furnaces are tapped every three to four hours by burning through a fire clay plug with an oxygen lance. The melt flows by gravity into a series of three metal trays, each with a 3.1-long-ton capacity, and excess slag overflows to a ladle. Each batch of metal is held separate until button samples taken with the tap are analyzed and the ferromanganese found to meet the various specifications required by customers. The three grades of metal made at the plant contain 79 to 81 percent Mn, 76 to 78 percent Mn, and 74 to 76 percent Mn respectively. All other constituents are held within A.S.T.M. standards.

Tap trays, handled by a 10-ton overhead bridge crane, are taken to the cooling floor. Cooling takes about 24 hours, after which the trays are tilted and the slag barred off. The ferromanganese is broken and loaded into empty trays. Loaded trays are taken to the loading dock by Hough fork trucks and the metal stockpiled for shipment.

OVERHEAD CRANE picks up the trays of ferromanganese for transfer to a cooling floor.

Operating personnel at the Pioche Manganese Company's ferromanganese plant include: Max J. Kennard, general manager; R. W. Lottridge, assistant to the general manager; James F. Orr, general superintendent of operations; F. L. Leonard, metallurgical assistant to the general manager; F. B. Petermann, assistant general superintendent; Loyal S. Phillips, plant superintendent; and Roy Kirk, master mechanic.



PIOCHE MANGANESE Company's ferromanganese plant occupies one unit of the former Basic Magnesium Industries plant site.

Aerial view of Puerto Ordaz, Venezuela, the shipping port for the Orinoco Mining Company. With increasing shipments of iron ore, this is destined to become one of the world's major ports. It is located at the junction of the Caroni and Orinoco rivers, 88 miles by rail from Cerro Bolivar, and 178 miles up the Orinoco from the Atlantic Ocean. Railroad trains of ore from the mine enter the port area at top center, and are unloaded at the rate of 67 cars per hour. Orinoco, the United States Steel Corporation subsidiary, plans to mine and ship 5,000,000 annual tons of ore from Cerro Bolivar which was discovered by U. S. Steel geologists in 1947. See MINING WORLD, May 1950, December 1953.

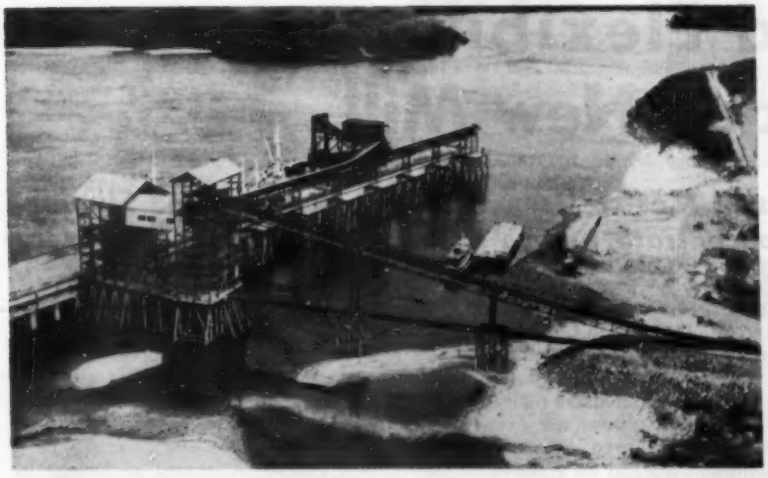
Orinoco Loads 6,000 Long Tons Of

At Puerto Ordaz provisions have been made for stockpiling 470,000 tons of crushed ore. This will make mining and shipping operations interdependent while assuring continuity of supply. The crushed ore stockpile is built up by this traveling belt conveyor bridge. It has a span of 400 feet and is designed to handle 1.67 long tons of ore per hour which has been crushed so that 85 percent will pass between bars spaced with 5-inch clear openings. Incoming ore travels along the 60-inch-wide belt at right, then to the bridge belt conveyor by means of the high tripper propelled by the bridge. A second tripper, on the bridge belt conveyor, discharges the ore onto the stockpile below.

Every second while a ship is being loaded at Puerto Ordaz 1.67 long tons of high-grade Cerro Bolivar iron ore are transported along the belt conveyor shown on the right side of the river loading dock. The ship berthed beside the pier is almost dwarfed by the dock and 65-foot-high shiploader, which was designed to operate at any time of the year despite the annual 39-foot rise and fall in the river level. The versatile shiploader can be quickly positioned anywhere alongside the dock. Its pivoted boom can be raised or lowered a total of 70 feet, and the lower shuttle belt can be extended to reach across the widest ship. One man in the shiploader operating cab controls not only all movements of the shiploader, but the speed and capacity of the entire reclaiming system, from storage pile to ship, by means of a variable voltage electrical system. The ore handling system at Puerto Ordaz was designed, furnished, and installed under direction of the Link-Belt Company as prime contractor. The shiploader was built by the Wellman Engineering Company. Erection was done by the McDowell Company, S. A. of Caracas, Venezuela. The first shipload of iron ore reached United States Steel Corporation's Fairless Works, Morrisville, Pennsylvania, January 19, 1954.

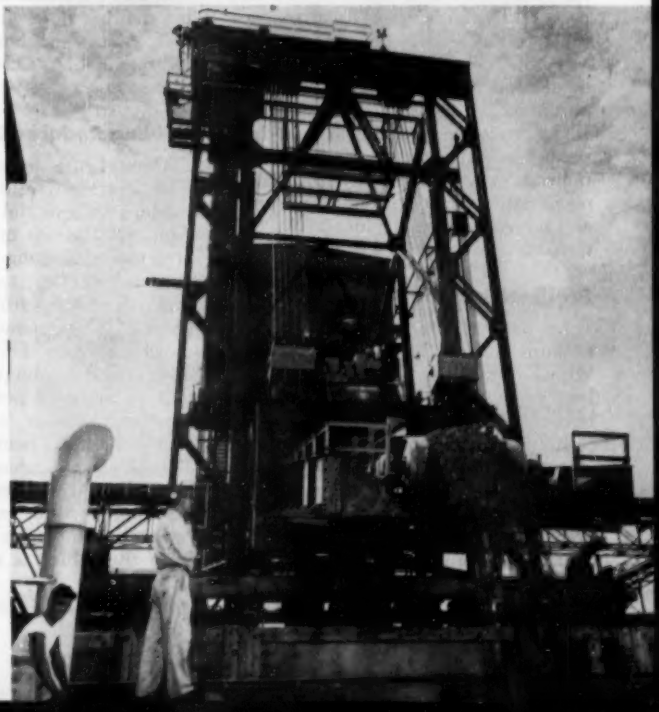
Iron ore is reclaimed from storage at the rate of 6,000 long tons per hour by means of four rotary plow feeders which travel back and forth beneath the stockpile in two parallel tunnels. Each feeder consists of two sets of rotors, each with six rotating bladed arms, mounted on a self-propelled, track-mounted carriage as shown in the photograph. As the feeders move along the tunnel, they plow the ore from a continuous shelf onto a 48-inch-wide transfer belt conveyor mounted on the carriage. This belt loads the reclaim-belt conveyor directly below, which carries the reclaimed ore out of the tunnel to a transfer house (left background) and onto another belt conveyor leading to the dock.

Cerro Bolivar Iron Ore Each Hour



After ore has been reclaimed from the stockpile, it is conveyed to the loading dock. Enroute, the ore is sampled in the high structure alongside the dock. Every hour 60 long tons, or 1.0 percent of the 6,000-long-tons-per-hour transfer system, are cut off the main belt for a sample. This sample is then split until a final five-pound sample is cut out for analysis. Sample reject is returned to main conveyor. Ore is automatically weighed by a Merrick Weightometer as it is conveyed from the sampling plant. The beach and high-water mark in the foreground give an indication of the tremendous change in the river's water level as a result of heavy storms and the season of the year.

Discharge end of the shiploader taken aboard one of the first ships loaded with Cerro Bolivar iron ore. This is the final step in the long chain which makes shipment of ore from one of the world's largest high-grade deposits possible. The first link in the production chain starts high on Cerro Bolivar as an 8-cubic yard Bucyrus-Erie electric shovel digs a bucket full of broken ore. The shovel loads a 20-cubic-yard Mack truck which hauls the ore about one half mile downhill from the working face to the structural steel loading docks. At the dock the truck dumps directly into a 90-long-ton gondola railroad car. This car is made up into a 93-car-long train for the 88-mile haul to the Puerto Ordaz car unloader. Diesel-electric locomotives haul the trains to the port in approximately 7 hours and 50 minutes. Ruling grade in favor of the loaded train is 0.2 percent. Ships tie up to the ore loading dock and the shiploader moves alongside the opened hatch. The 72-inch-wide shuttle belt conveyor is dropped down over the center of the hatch and loading starts. The ship hold can be trimmed without any auxiliary equipment. The shuttle conveyor is positioned at the desired point so that the ore drops into the exact spot in the hold to maintain the ship's trim.



GRAVITY-FLOTATION MILL of the San Francisco Mines of Mexico, Ltd. with the town of San Francisco del Oro, Chihuahua, Mexico in the background. The mill treats 2,000 metric tons of ore daily.

Tabling and Flexibility Make a Unique New Mill

San Francisco Mines of Mexico Uses Tables to Reduce Lead Sliming, To Make a Richer Concentrate, and to Assure Higher Copper Recovery

Near the town of San Francisco del Oro, Chihuahua, Mexico in one of North America's oldest mining districts (gold production began in 1547 near Santa Barbara, only a few miles away), San Francisco Mines of Mexico, Ltd. operates two mines, the San Francisco and the Clarines and recently rebuilt the 2,000-metric-ton-per-day San Francisco mill. Variable ore from these properties demanded flexibility in the mill circuit and the new design includes primary crushing, grinding, and tabling; secondary crushing, grinding, and tabling; and flotation circuits. Three marketable concentrates—lead, zinc, and copper—are produced by optional combinations of these circuits.

Production From Two Mines

At both mines, shrinkage stopes account for the bulk of production. Where dilution of the ore is a problem, however, a change is made to horizontal cut and fill. In wide stopes, column-and-bar-mounted Ingersoll-Rand and Gardner-Denver 3-inch drifters are used for drilling. In the less common narrow stopes, stopers are used. Gardner-Denver and Eimco mucking machines load ore from shrinkage draw holes and cut-and-fill chutes into Card cars on the main haulage levels.

To insure adequate underground ore reserves, extensive diamond core drilling programs are constantly maintained. Three and often four drills are worked on a two-shift basis drilling holes from 20 to, rarely, 500 meters in length. Costs have averaged about $3.50 per foot of completed hole.

Tabling Reduces Galena Slimes

One of the features of the new San Francisco mill seldom seen in modern differential (e.g., lead-zinc-copper) flotation mills is the extensive use of shaking tables, both Deister and Wilfley, to recover a high-grade lead concentrate. Because the galena is extremely friable—much more so than the other valuable minerals, it is removed from the circuit as early as possible to prevent excessive slimes losses and filter blinding. It has been found that this is best accomplished by tabling the pulp discharged from the primary grinding section, made up of four rod mills in open circuit. Tailing from the tables is again ground, in three closed-circuit ball mills, and tabled by a second section similar to the first. These two operations remove 50 percent of the lead contained in the form of a high-grade concentrate assaying 75.0 percent lead, 3.0 percent zinc, and 0.5 percent copper. A second advantage in tabling stems from the difficulty in separating copper from a bulk flotation product of lead and copper. Tabling lead from the circuit raises the ratio of copper to lead in flotation feed and facilitates both separation and recovery.

Each of the two operating mines has a primary crushing installation that reduces the ore to minus-6-inches. At the Clarines plant this primary crusher is a No. 6 McCulley gyratory, and at the San Francisco mine, a No. 13 Allis-Chalmers gyratory. Production averages 15,000 tons per month at the Clarines and 45,000 tons at the San Francisco.

Flexibility in Crushing

Ore is carried by aerial tramways from the two mines to central transfer bins and from these to a series of 40-ton coarse ore bins at the mill. A 4- by 10-foot double deck Ripl-

Flo screen receives the coarse ore and separates it into three fractions before further reduction. Plus-1-inch ore is crushed in a 4-foot standard Symons cone; the plus-½-inch, minus-1-inch fraction is reduced in a 4-foot shorthead Symons cone crusher (a second 4-foot standard Symons cone is used for reduction of either of these fractions as need dictates) and joins the crushed coarse fraction. This combined product is passed over a 4- by 10-foot Ripl-Flo screen that separates at-½-inch, returning the coarse fraction to the shorthead cone crusher. Minus-½-inch ore from both the primary and secondary screens is combined and transferred to fine ore bins. Ore from the two mines is handled separately. A 600-ton bin is provided for storage of crushed Clarines ore and a 3,400-ton bin stores San Francisco ore.

Grinding and Tabling

Two 7- by 11-foot Marcy rod mills and two 5- by 10-foot Allis-Chalmers rod mills form the primary grinding circuit that reduces the ore to 15 percent plus-20-mesh. Pulp from the rod mills is transferred by a 6-inch Wilfley pump to the primary tabling circuit where nine tables are used to make a concentrate, middling, and tailing separation. Middling is re-

treated in a circuit of three tables that produces tailing and concentrate which are added to the tailing and concentrate from the rougher section. Concentrate from this circuit represents 35 percent of the lead contained in mill feed.

Tailing from the primary tables is sized in two 7- by 27-foot Dorr FX rake classifiers, sands from which are the feed for the secondary grinding circuit with overflow forming flotation feed.

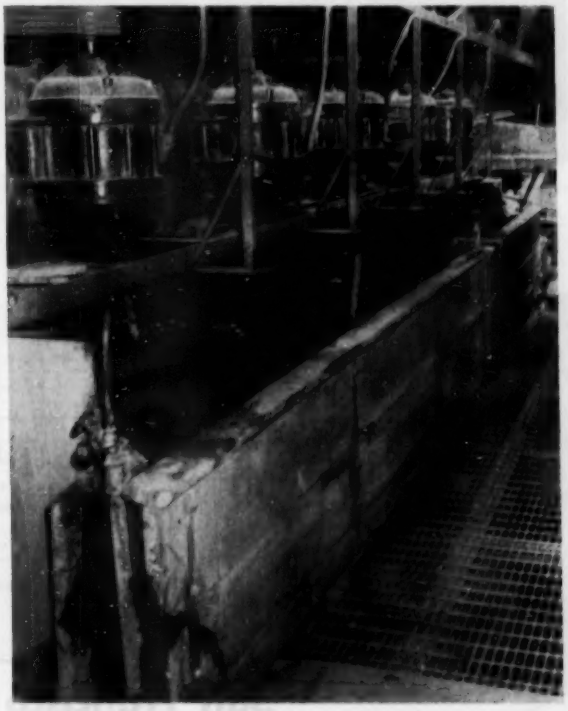
Two 7- by 11-foot Marcy ball mills and one 6- by 10-foot Allis-Chalmers ball mill are used for secondary grinding. Ball mill discharge is concentrated in a secondary tabling circuit similar to the primary circuit. Tailing from the secondary tables returns to the classifiers and concentrate joins the primary concentrate. The combined product totalling 50 percent of lead in the head assays 75.0 percent lead, 5.0 percent zinc, and 0.5 percent copper, with some values in gold and silver.

Flotation Circuits

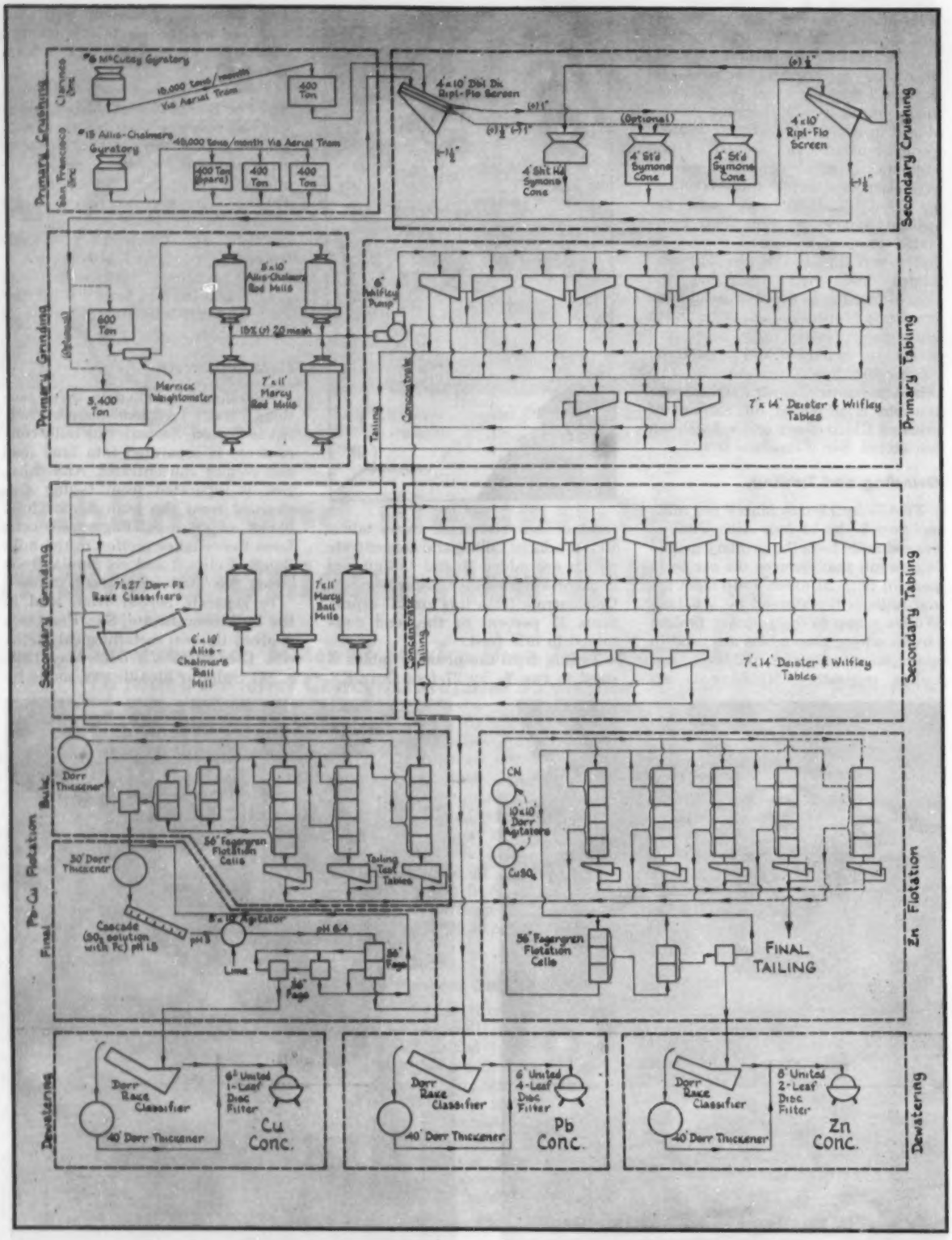
Flotation is handled in three sections. First, a bulk lead-copper product is floated. Second, this bulk concentrate is separated into final lead and copper concentrates. And third, zinc is separated from tailing discharged from the bulk float. Three banks of 56-inch Fagergren cells form the rougher section in the bulk flotation circuit and six similar cells clean the lead-copper concentrate.

To separate copper from lead in the bulk concentrate, San Francisco evolved its own metallurgical methods. (See MINING WORLD May 1948, p. 16) Sulphur dioxide gas, made by

Primary tabling removes 35 percent of the galena in the mill feed as a high-grade concentrate ready for dewatering. It is mixed with flotation concentrate before filtering to prevent fine galena from blinding cloths.



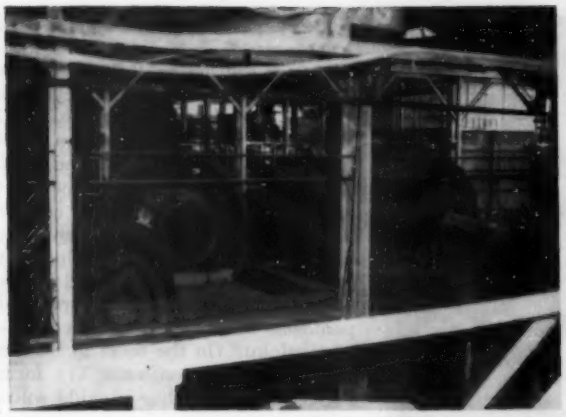
Rougher section of the flotation circuit is made up of three banks of five Fagergren cells. A bulk concentrate containing the lead and copper minerals is floated in this section.



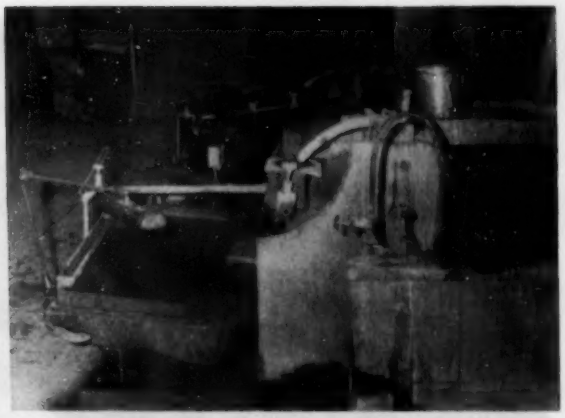
San Francisco Mill Flowsheet

San Francisco Mines of Mexico, Ltd.

San Francisco del Oro, Chihuahua, Mexico



The new primary grinding section (shown here during construction) includes two Marcy and two Allis-Chalmers rod mills in open circuit. The single pass prevents overgrinding of the friable galena before tabling.



At the tailing end of each bank of rougher flotation cells (in both the lead-copper and the zinc circuits) a small Wilfley table is used to visually check the tailing for efficiency of separation.

burning elemental sulphur, and iron in the form of scrap are combined in aqueous solution to form iron sulphite and sulphurous acid. The solution is then mixed with the thickened bulk concentrate in a baffled trough of wood (locally called a "cascade") and fed to an agitator where lime is added. The mixture has a pH of 3.0 before the addition of lime, which raises it to a carefully controlled 6.4. The action of the sulphurous acid and iron sulphite depresses the lead. Tailing from the separation circuit, therefore, is the final lead concentrate and copper is recovered in the removed froth.

Tables for Efficiency Checks

Tailing from the rougher cells in the bulk flotation circuit is passed

Zinc and bulk float concentrates are cleaned in similar circuits of six Fagergren cells.

Discharge from the coarse ore bins at the mill is screened and fed to Symons cone crushers for secondary crushing. The two mines, San Francisco and Clarines, each have a gyratory for primary crushing.

Crushed ore from the fine ore bins is automatically weighed by Merrick Weightometers as it is conveyed to the primary grinding section. Note the steel grate flooring under the ore bins.

Column-and-bar Ingersoll-Rand and Gardner-Denver 3½-inch drifters are used in wide stopes—either shrinkage or horizontal-cut-and-fill.

across a small table at the end of each bank of cells to visually check the circuit efficiency. After conditioning with copper sulphate and cyanide in two 10- by 10-foot Denver Equipment Company agitators, the tailing is fed to the head of the zinc flotation circuit. Here roughing is done by four banks of five 66-inch Fagergren flotation cells with one similar bank for standby service. As in the lead section, each bank is equipped with a small table for visual inspection of the tailing. Middling returns to rougher feed, tailing is final plant tailing, and concentrate is cleaned in six Fagergren cells.

Dewatering circuits for the three concentrates are similar. Each uses a Dorr rake classifier and a 40-foot Dorr thickener. Final dewatering is handled, in the case of copper, by a 6-foot, single-leaf United disc filter; in the lead circuit, by a 6-foot, four-leaf United disc filter; and in the zinc section, by an 8-foot, two-leaf United disc filter.

Service and Supply

Lead concentrate is shipped to the American Metals Company, Ltd.'s Mexican subsidiary Compañia Metalurgica Peñoles S.A. plant at Torreon. Zinc concentrate is shipped to Blackwell, Oklahoma to be treated by the Blackwell Zinc Company, another American Metals plant. Copper concentrate is smelted at an American Smelting and Refining Company plant at San Luiz de Potosi, Mexico.

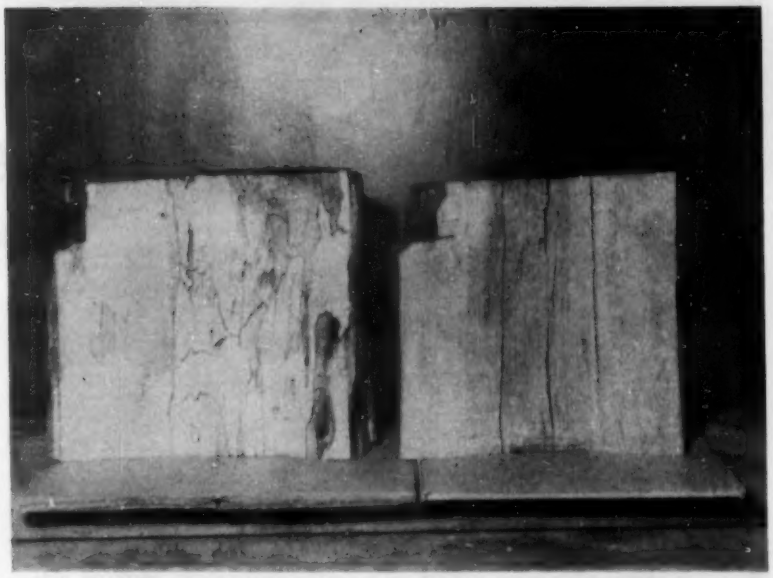
Rods, balls, and liners for both the primary and secondary grinding sections are locally supplied. Rods are made in Monterrey and the balls and liners are manufactured in Parral, a few miles from San Francisco del Oro. Consumption averages about 0.75 kilograms of 3-inch rods per metric ton of feed, and 0.576 kilograms of balls per ton. Liners have been found to last from six to 12 months.

The lead flotation circuit use 0.026 kilograms of cyanide per ton of feed, 0.184 kilograms of zinc sulphate, 0.079 kilograms of Z-30, and 0.050 kilograms of crysilic acid. Zinc flotation consumes 0.017 kilograms of cyanide, 0.053 kilograms of zanthate, 0.167 kilograms of copper sulphate, 0.004 kilograms of Barrott 634, and 0.003 kilograms of pine oil. For copper separation the following are added: 0.278 kilograms of 72 percent hydrated lime solution, 0.042 kilograms of starch (to depress the lead slimes so easily formed), 0.002 kilograms of pentasol, 0.186 kilograms of equivalent sulphur (in the form of SO_2 in solution), and iron cans (to form $FeSO_2$ in the sulphur dioxide solution).

The relatively isolated San Francisco properties include complete housing facilities for staff, labor, and guests. General manager of the operations is H. B. Hanson. H. M. Craigie is assistant general manager. General superintendent is A. B. O'Neil whose chief interest is in the mining phase of operations. G. O. Deshler is consulting metallurgical engineer for the company. Direct supervision is handled by H. G. Dudley, mine, and T. R. Herndon, mill. Experimental work on metallurgical methods is directed by A. Astiazaran in the laboratories at the San Francisco mill.

Among the men who direct the operations of San Francisco Mines of Mexico, Ltd. are (left to right) H. M. Craigie, assistant general manager; G. O. Deshler, consulting metallurgical engineer; A. B. O'Neil, general superintendent

Pictured at left is T. R. Herndon, mill superintendent, and at right is A. Astiazaran who handles the metallurgical research in the laboratories of the San Francisco mill.



Joggle end of timber legs after two years in service. The one on the right is the treated timber, the one on the left, untreated.

By R. W. Edwards
Superintendent, Morris Mine
Inland Steel Company
Ishpeming, Michigan

MORRIS TIMBER PRESERVATION PAYS

Inland Steel Company dips all permanent mine timber in underground plant for high-humidity curing of proven-life timber at lower cost

The Morris mine, operated by Inland Steel Company, is located about five miles west of Ishpeming, Michigan, near the west end of the Marquette Iron Range. The ore, a soft hematite, is mined by sub-level stoping and sub-level caving methods, and a considerable amount of timber is required in the main level and sub-level drifts. In most of the main haulage drifts where timber sets were originally placed at five-foot intervals, the heavy spalling ground now requires continuous timber support. Since the average life of untreated timber used in the mine was about three years, maintenance and replacement of the rotting timber in these original drifts was becoming very burdensome, not only from the standpoint of cost of replacement, but because of the interference with normal tramming operations.

In order to reduce this excessive maintenance, a thorough investigation was made of the possibility of timber treating by various methods.

Most of the timber treating methods studied required special facilities such as pressure tanks, heating plants, etc. However, one method was found in which timber could be treated by dipping, with the salts penetrating the wood by the principle of osmosis. This method works best with green timber, which is the usual condition of timber as received at the mine. If not green, the timber can be soaked to approximate the green stage. The bark must be removed prior to treating. As this method required the simplest equipment installation, and tests by various government agencies indicated the life preservation of the wood compared favorably with many of the more expensive methods, it was decided in July of 1949 to start treating timber on a trial basis.

In certain sections of the mine, test pieces of treated and untreated timber were placed side by side for comparison of performance. At the end of one year, the untreated test pieces showed considerable evidence of wood rot, while the treated pieces remained thoroughly sound. This satisfactory test warranted the installation of a treating plant with enough capacity to treat all hardwood timber to be installed in locations where the requirement for service life was longer than two years.

Why Treat Timber Underground?

The plant requirements for this method, if done on surface, consist of a dipping tank with a crane or other method of handling the timber to the tank. The timber should then be stored in tight piles covered with kraft paper to maintain high humidity within the pile and allow the salts to penetrate the wood. Since the relative humidity underground is approximately 94 percent, it was noted that the treated timber could be stored underground for the soaking process without covering. With the extreme winters in the north country, the difficulty of maintaining the required dipping tank on surface without a heated building again presented operational problems. These considerations led to the decision to install the treating and storage facilities underground, at a convenient location on an abandoned level.

An overhead crane was installed, with a small electric hoist and timber hook to handle the material from the timber trucks to the dipping tank and from the drain board to the storage pile. A small frame was made to hold about eight pieces of cribbing for rapid handling and dipping. The dipping tank, 12 feet long, 2 feet wide, and 2 feet deep, was made of ¼-inch steel plate. A compressed air line was placed around the inside of the bottom of the tank. This pipe is perforated, and the escaping air keeps the salt suspension in continual agitation during the dipping process. The tank is equipped with a drain rack to mini-

Removing bark from mine timber with mechanical rosser. Floating action of the cutting head makes cut of uniform depth following contour of the timber.

mize solution loss. For best results, the timber should remain in the storage area at least 30 days after treating, but it can be used as soon as the salts disappear from the surface of the wood.

Remove Bark Before Dipping

The removal of bark, which had not been necessary for untreated timber, presented another problem. For speed and economy, this had to be done by mechanical means rather than by hand. A satisfactory debarking machine was obtained from the H. L. Crouse Company, Crouseville, Maine. This was placed in operation on surface to peel the timber before being sent underground. Operated by three men, this machine can peel timber up to 15 feet long and up to 18 inches in diameter at the rate of about 150 pieces per eight-hour day. The use of this machine eliminated the slipperiness of hand-peeled timber, as the peeling machine leaves a rough surface, making it easier to handle and affording a better chance for the penetration of the salts.

Timber sets are treated before framing. As the timber is framed for installation, any fresh cuts are painted with a plastic solution of the same material as used in the original treatment.

Cost Comparison Between Treated and and Untreated Timber

Set at Inland Steel Company's Morris Mine, Ishpeming, Michigan

Cost Items	*Untreated*	*Treated*
Cost of a timber set	$ 10.80	$ 10.80
Labor, framing & installing	15.00	15.00
Treating ($1.00 per timber)	——	3.00
Total Cost ..	$ 25.80	$ 28.80
Life (in years)	3	6 or more
Cost per year per set	$ 8.60	$ 4.80 or less

At the end of the second year, two more timbers were removed for testing purposes and, as shown on the accompanying cut, the untreated timber had suffered serious decay and wood deterioration while the treated timber was completely sound. Chemical tests indicated the sodium fluoride in the salts had penetrated to a depth of 2 inches by the end of the second year.

Untreated Dry Rot in 3 Years

At the end of three years, treated and untreated test pieces were removed again. The untreated timber was at the point of failure as a result of rotting, whereas the treated timber apparently was as sound as the day it was installed. An interesting feature was that all treated timber pieces removed were soaking wet inside when cut open, while the untreated ones were dry rotted. Chemical tests on the treated timber indicated a depth of penetration of about 3½ inches after three years.

To date there have been only five failures of treated timbers in the mine. In all instances they were caps broken by direct weight, and the breaks were typical of green timber rather than the break of a timber weakened by rot.

View of soaking pile in the underground treating plant showing overhead crane, small electric hoist, and timber handling method. Dipping tank and drain board in foreground.

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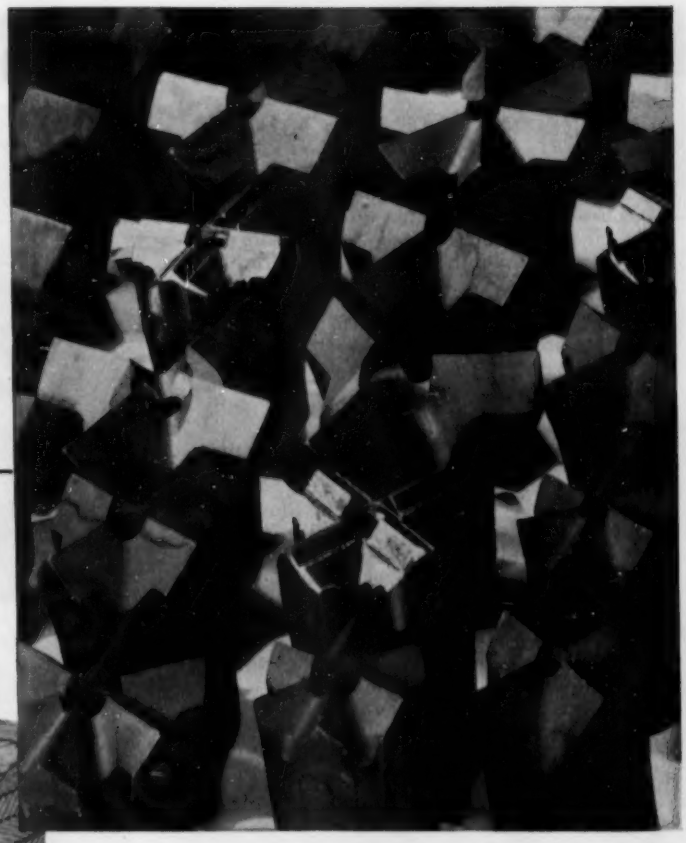

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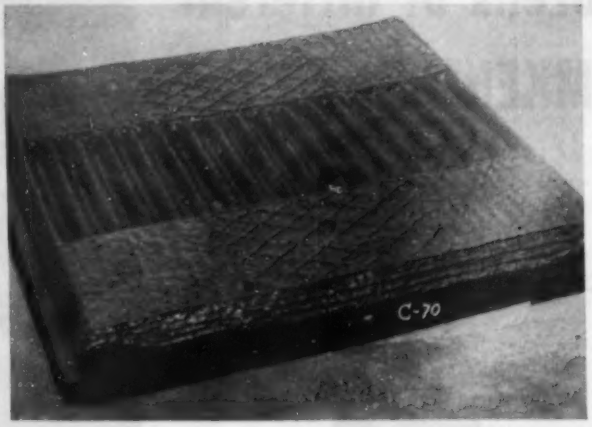
The 24x36 crusher plate illustrated originally had standard corrugations running full length. A Two-Tone Shop rebuilt the worn plate to this design and the operator reported the following results:



Normally two stationary jaws were worn out to one movable plate. But the specially built stationary plate pictured lasted exactly as long as the movable plate, which meant a 50% saving in the cost of stationary plates.

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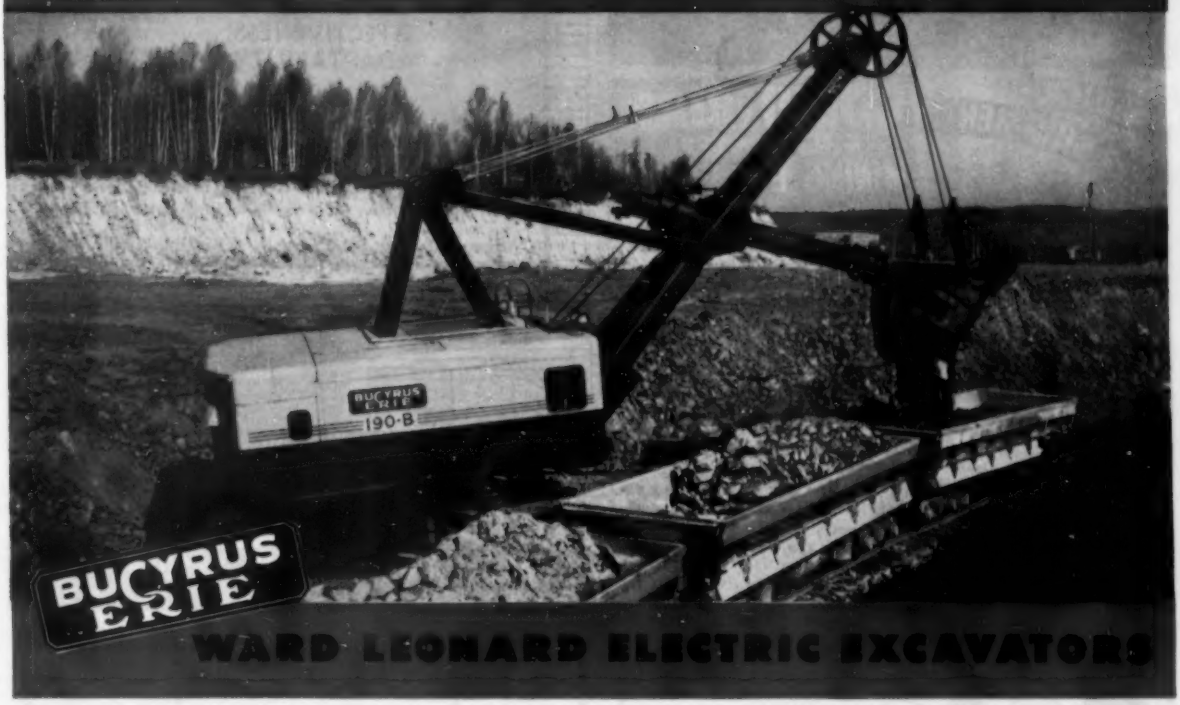

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ACTIVITIES OF U. S. MINING MEN

E. M. Paris, mine superintendent for United States Vanadium Company at Uravan, Colorado since 1948, has been named manager of mines for the firm's Colorado operations. He replaces **John W. Hill,** who recently became general manager of Worcester Mines in Uravan. Mr. Paris, who has been with U.S. Vanadium since 1946, will make his headquarters in Grand Junction, Colorado.

Herbert W. Rogers is the new president of Lithium Corporation of America, Inc. He has served as secretary and general counsel for the New York firm since 1941.

H. J. Hull, past president of the Northwest Mining Association, recently was named to the U.S. Labor Department's Northwest Labor-Management Board.

H. B. Megill has been promoted to the position of executive vice president and general manager for Chromium Mining and Smelting Corporation, Chicago, Illinois. Mr. Megill's most recent position was that of executive vice president and general manager for the Chromium subsidiary, Pacific Northwest Alloys, Inc., in Spokane, Washington. Formerly, he was general manager of Dominion Manganese, Ltd. in Toronto, Ontario, Canada.

A. J. Yahn, recently superintendent at the Societe des Mines de Zellidja operations in French Morocco, has joined the staff of the Western-Knapp Engineering Company Division of Western Machinery Company. He will hold the position of staff metallurgist for the Eastern division, with headquarters in Chicago, Illinois. Mr. Yahn was mill superintendent for the Shenandoah-Dives Mining Company plant in Colorado and has also been manager of St. Louis Smelting and Refining Company at Fredericktown, Missouri and a consulting engineer for Newmont Mining Corporation.

Emert W. Lindroos, formerly district metallurgist at the Cleveland-Cliffs Iron Company's Republic mine, replaces **J. A. Poll** as assistant superintendent of the Humboldt mine in Humboldt, Michigan.

James H. Polhemus, metallurgist with the American Zinc Company of Tennessee, was promoted to the position of assistant mill superintendent at Mascot, Tennessee, April 1. He succeeds **Robert Brackin,** who is now in charge of Kaiser Steel Company's milling operations at Eagle Mountain, California.

Robert T. Chapman is the newly appointed assistant resident manager of the Potash Corporation of America. He recently was mining consultant for Union Carbide and Carbon Corporation in New York City.

Walter E. Lewis, chief of the U.S. Bureau of Mines, Mineral Survey Branch in Region V, has been visiting drilling operations on the Cuyuna range in Minnesota. Purpose of the current operations is to study manganese-bearing slates in the area north of Manganese, Minnesota.

Recent executive changes at the Bunker Hill and Sullivan Mining and Concentrating Company include the following (left to right above): STANLY A. EASTON, president, was elevated to the newly created post of chairman; J. B. HAFFNER, vice president and general manager, became president; P. C. FEDDERSON, smelter general superintendent, was named general manager, and JOHN D. BRADLEY, director, assumed the new position of executive vice president. The changes were announced at a recent meeting of the board of directors in San Francisco, California. Operations of the firm are concentrated in Shoshone County, Idaho.

J. Q. A. Price has succeeded **Wade V. Lewis** as president of the Elkhorn Mining Company. The firm has properties near Boulder, Montana.

William E. Wrather, chief of the United States Geological Survey, has been awarded the John Fritz Medal by four national engineering societies. The medal, given by the American Institute of Mining and Metallurgical Engineers, the American Society of Civil Engineers, the American Society of Mechanical Engineers, and the American Institute of Electrical Engineers, goes to the most outstanding engineer in the four societies. Mr. Wrather, a past president of the A.I.M.E., has had a diversified career during his years with the Department of Interior. His activities have included many explorations in foreign countries, special projects during both World Wars, and participation in cooperative research, both in and out of government service.

Herbert W. Carlson succeeds **Robert P. Wallis** as president of the Columbia Lead and Zinc Mining Company in Spokane, Washington. Vice President is **Raymond Paulsen.**

Leland B. Flint, president of Flint Distributing Company, has been elected to Kennecott Copper Corporation's board of directors. Mr. Flint also holds directorships in the Bank of Utah and the Walter Bank and Trust Company in Salt Lake City.

The Society of Exploration Geophysicists has announced its officers for the coming year. They are: **Paul L. Lyons,** exploration manager of Anchor Petroleum Company, Tulsa, Oklahoma, president; **Roy F. Bennett,** chief geophysicist for the Sohio Petroleum Company, Oklahoma City, vice-president, and **Hugh M. Thralls,** vice-president of the Seismograph Service Corporation, Tulsa, secretary-treasurer.

New members of the mining industry include the following January graduates of the Wisconsin Institute of Technology: **Herbert Mee,** now in New York City for a training program with the Cerro de Pasco Mining Company of Peru; **Loren Ziech,** who has a position with U.S. Gypsum Company; and **Grant Collins,** U.S. Gypsum.

Howland Bancroft and **E. C. Larson,** mining consultants, have been inspecting uranium properties of the Minerals Engineering Company in Utah. They have visited the Utex Mi Vida mine and Western Mines Development claims during their tour. Mr. Larson is chief engineer for the Sylvania Electric Products Company.

Parke D. Snavely, Jr., supervising geologist at the United States Geological Survey Fuels Branch in Oregon and Washington, has been promoted to the post of supervisor for the branch's Pacific Region. His new headquarters will be in Menlo Park, California. Mr. Snavely has been succeeded by **Linn Hoover.**

G. L. Johnson, former manager of the Howard Drullard Company in San Francisco, now has his own mining and construction business in Woodside, California.

Charles Steen, founder of the Mi Vida mine in Utah's Big Indian district, recently purchased the Dove Creek State Bank in Dove Creek, Colorado. Mr. Steen, whose Utex Exploration Company produced nearly $2,500,000 in high-grade uranium in exploration work alone at the mine, also announced that contracts will be let soon for the uranium ore processing mill he plans to build in Moab. Cost of the mill is estimated between $3,000,000 and $5,000,000.

C. R. Knous, chief clerk in Kennecott Copper Corporation's McGill, Nevada office, has been named assistant division comptroller for Nevada Mines division. Mr. Knous first came to Kennecott in 1924 when he went to work as a machinist's helper at Ruth, Nevada. Since then he has spent most of his time working in the accounting department of Kennecott.

Kenneth L. Cook has been appointed associate professor and head of the department of geophysics at the University of Utah, Salt Lake City. Formerly employed with the U. S. Geological Survey, he will continue his affiliation on a part-time basis for reseach studies in geophysics. Dr. Cook was appointed chairman of the geophysics subdivision of the American Institute of Mining and Metallurgical Engineers during 1953.

Felix Wormser, assistant secretary for mineral resources of the Department of the Interior, heads the newly established Titanium Advisory Committee. The group will advise the Office of Defense Mobilization on problems regarding titanium and will cooperate with other Federal agencies in developing recommendations for the government's program to expand titanium production.

John Ferguson, formerly with Telluride Mines in Telluride, Colorado, is now employed by the Telluride Iron Works Company in Durango.

A. O. Schaefer, vice-president of The Midvale Company, has been named Delaware Valley Metals Man of the Year by the American Society for Metals in Philadelphia. The award for metallurgical accomplishments will be presented annually by the society.

Pictured right are the two University of Arizona mining students who will split the annual scholarship awarded by the Kennecott Copper Corporation. They are RICHARD D. MENDOZA (left) and CHARLES B. LEONARD (right). Between the two students is A. P. MORRIS, general manager of Kennecott's Ray, who made the award.

Clayton G. Ball has succeeded **Paul Weir** as president of the Paul Weir Company, Inc. in Chicago, Illinois. Mr. Weir has assumed the position of chairman of the board for the engineering firm. Other board changes at the company include the election of **Raymond E. Zimmerman** as vice-president.

C. J. Barber has been appointed mine engineer for the United States Smelting Refining & Milling Company in the Salt Lake City, Utah area.

C. R. Brooks, assistant chief mill accountant, has succeeded **E. J. Gardner** as chief mill accountant of the department of mills for Kennecott Copper Company's Utah Division.

M. G. Mastin, engineer at the United States Bureau of Mines plant at Boulder City, Nevada, has resigned as head of the titanium development section. Mr. Mastin intends to go into consulting work. He has been with the Bureau since 1951.

The Nevada section of the American Institute of Mining and Metallurgical Engineers elected the following officers in the group's recent state-wide balloting: **John B. Zadra**, U.S. Bureau of Mines, chairman; **J. Ray Coulter**, Coulter, Harden & Company in Henderson, vice-chairman, and **Victor E. Kral**, Nevada Bureau of Mines, secretary-treasurer.

Karl W. Jasper has been reelected president of Grandview Mines in Spokane, Washington. Also reelected were **Paul Hoetzel**, vice president, and **E. K. Barnes**, secretary-treasurer.

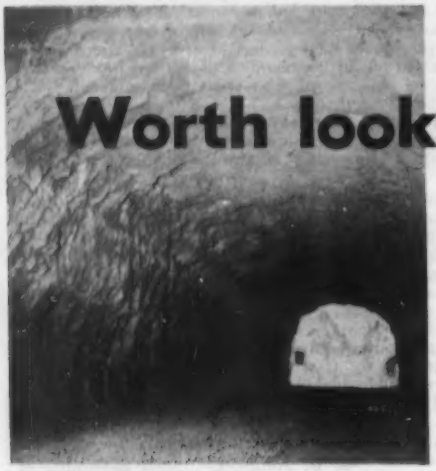
OBITUARIES

Oliver Hall, 74, consulting engineer and director for Noranda Mines Ltd., died February 15 in Toronto, Canada. Active in the mining industry for nearly 50 years, Dr. Hall was known mainly for his work with Noranda, Mond Nickel Company, Ltd., and The International Nickel Company of Canada, Ltd. He held directorships in several other mining firms and was active in various Canadian mining associations.

Lloyd M. Kniffin, 70, commodity specialist in the U.S. Bureau of Mines Foreign Minerals Division, died early in February in Washington, D.C. He had been with the Bureau since 1949. Previous to that time Mr. Kniffin spent many years managing mining properties in the southwest United States and was also connected with oil development in Texas and Mexico. He served as a consulting engineer to the Department of National Economy of Mexico from 1937-1941.

W. O. P. Fullerton, 71, former manager of the Denver Equipment Company's New York office, died in Fort Collins, Colorado in January. He had served Denver Equipment in Johannesburg, Union of South Africa, and London before retiring in 1950.

Eero Makinen, 67, general manager of the Outokumpu Company in Finland, passed away unexpectedly in Helsinki. A leading mining engineer in Finland, he was a government geologist and inspector for several years. Dr. Makinen was also a member of the Finnish Parliament and Cabinet a short time before his death.



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ACTIVITIES OF INTERNATIONAL MINING MEN

CHARLES P. GIRDWOOD has been named general manager of Dome Mines, Ltd. with headquarters at South Porcupine, Ontario, Canada. He succeeds ROBERT E. DYE, who will continue with the firm as a consultant. Mr. Girdwood joined Dome Mines in 1939 as assistant engineer and became chief engineer in 1942, a post which he held until his appointment as general superintendent in 1947.

John D. Burgess will assume the position of assistant resident manager at Cyprus for Cyprus Mines Corporation early next Fall. Recently assistant superintendent at Kaiser Steel Corporation's iron ore mine in Eagle Mountain, California, Mr. Burgess also has had experience with Consolidated Coppermines Corporation, American Smelting and Refining Company, and Ventures, Ltd., in Canada.

Jack R. Hough, member of the University of Illinois geology department, is participating in a three-year technical cooperation program of the United States Foreign Operations Administration at the Indian Institute of Technology in Kharagpur, India. Dr. Hough is one of the University of Illinois professors sent by FOA to develop and conduct courses and perform research projects at the government school, which is now in its third year. The plan, which has a maximum dollar cost of $450,000, also provides for purchase of scientific equipment for the school and special studies for faculty members in the United States.

Viola MacMillan was re-elected president of the Prospectors and Developers Association at a recent convention in Toronto, Canada. Serving with Mrs. MacMillan during the year will be **Cyril T. Young**, vice president; **Fred Jowsey**, secretary, and **Mrs. D. I. Drewe**, assistant.

Yngve Hagerman, Swedish safety engineer and mining department chief for the Workers Protection Board in Stockholm, Sweden, has been granted a four-nation study tour fellowship by the International Labor Organization, a United Nations agency. The grant, which will take Mr. Hagerman to France, Germany, Canada, and the United States, provides for study of premature detonation of blasting charges by radio and television waves. Mr. Hagerman also hopes to find more effective ways of protecting workers in blasting operations.

David D. Baker, well-known tungsten metallurgist, addressed a recent meeting of the Mining Association of the Southwest in Los Angeles, California. Mr. Baker told the association about his experiences as head of a team of tungsten experts sent to the Sangdong mine in Korea by the Utah Construction Company in 1953.

Jerzy M. Zarzycki has been named technical advisor in photogrammetry and geodesy for Canadian Aero Service, Ltd. in Ottawa, Canada, Formerly with National Research Council of Canada, Dr. Zarzycki will aid the firm in its topographic mapping work and will carry on research projects for them.

George W. Hills, chief engineer of the Electrolytic Refining and Smelting Company of Australia, is in the United States inspecting continuous casting of copper. His plans include a trip to the American Smelting and Refining Company's plant in New Jersey.

John K. Gustafson, chief geologist, and **J. W. Buford**, coordinator of Canadian development, have been appointed vice presidents of Hanna Coal and Ore Corporation.

R. H. S. Ennis is now with Uruwira Minerals, Ltd., Mpanda, Tanganyika, Africa. Formerly he was working for Lake George Mines in Australia.

W. G. Pyne-Mercier has been appointed Government Mining Engineer for the Union of South Africa.

John A. Graham, general superintendent of Quemont Mines, Ltd., has been appointed manager of the British Columbia firm, Geco Mines, Ltd. Manager of Pioneer Gold Mines in British Columbia from 1949 to 1951, Mr. Graham has also been employed at the International Nickel Corporation, Sisco Gold Mines, Upper Canada and Brock mines.

Victor Hollister, geologist for American Smelting and Refining Company's Northwest mining division in Wallace, Idaho, has joined the staff of the Northern Peru Mining and Smelting Company, a subsidiary of the American firm. He expects to be at the Peruvian operation for approximately two years.

Carl E. Dutton, district geologist for the U. S. Geological Survey, attended a recent world mineral resources meeting of the United Nations in Geneva, Switzerland. Mr. Dutton's offices are in Madison, Wisconsin.

FRANK A. AYER, international copper mining consultant, has been named as one of the recipients of the Egleston Medal, Columbia University's highest award "for distinguished engineering achievement." Mr. Ayer, recently with the Copper Range Company and with the Phelps Dodge Corporation, formerly was with the Roan Antelope Copper Mines, Ltd. and the Mufulira Copper Mines, Ltd. in South Africa.

E. C. Roper, general manager of Britannia Mining and Smelting Company, Ltd., has been re-elected president of the Mining Association of British Columbia. Also re-elected were vice presidents **H. E. Doelle**, managing director of Sheep Creek Gold Mines, Ltd., and **E. O. T. Simpson**, general manager of Canadian Collieries, Ltd.

H. T. Heard is the new general superintendent of Eugenia Gold Mines Company in Lima, Peru. His former position was with Cia Minera San Jaun de Lucanas, Nazca, Peru.

Paul E. Young, mine manager, and **Donald E. Smith**, general superintendent, are two recent appointments at the Pronto Uranium Mines, Ltd. in Toronto, Ontario, Canada.

A four-man survey team from the U.S. Department of the Interior is conducting a field study of departmental operations in Alaska. Heading the committee is **Roy B. Earling**, Seattle, Washington mining consultant. Other members of the team are **Glen Duncan**, Haines, Oregon; **Gilbert H. Jertberg**, Fresno, California, and **Robert Coote**, a member of the department's technical review staff.

Bruce A. Gould, well-known mining engineer with widespread experience in the mercury field, has returned to California from a visit to the Monte Cuiata quicksilver mines in Italy and the Almaden mines in Spain.

ALAN M. BATEMAN, chairman of the department of geology at Yale University, was honored by the Madhya Pradesh Mineral Industry Association during his recent trip to India. At a reception in Nagpur in his honor Dr. Bateman (above) predicted a bright future for the Indian manganese industry. Despite the anticipated drop in demand during the next two or three years, Dr. Bateman said, mineral consumption will increase 100 percent during the next 25 years, and during that time manganese demand will rise by at least 60 percent.

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Increasing Exploration & Development Projects Cause Australian Uranium Investment Boom

Uranium company stocks are outstripping gold as the popular speculative investment in Australia with the increasing number of exploration and development programs being undertaken in the country.

A number of companies have been formed in Melbourne, Victoria. The latest is Northern Uranium Development N.L. which will acquire from Northern Territory Development Syndicate its permit over eight square miles at Rum Jungle and two authorities to prospect for uranium at Herberton 1,100 miles north of Brisbane, Queensland. The areas being acquired have been found to contain radioactive minerals but further development work will have to be carried out before uranium values can be determined.

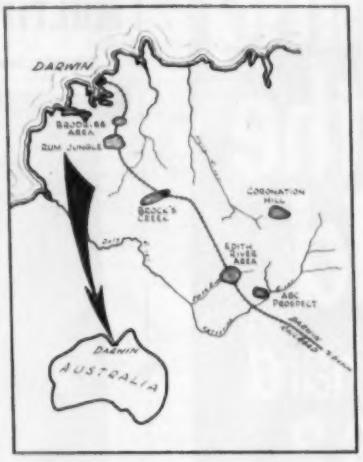
Northern Uranium's leases in the Northern Territory are at Brodribb (see accompanying map), Brock's Creek, Mount Wells, Coronation Hill, and near Edith River. Also at Brock's Creek, Brock's Creek Uranium N.L. will take over 456 acres, as well as the Cosmopolitan Howley gold leases of 40 acres. The company is jointly formed by Doria Gold Mines N.L. and Territory Scheelite N.L.

Austral Mining Company N.L., in conjunction with Pioneer Mines N.L. and Poseidon N.L., will form Uranium Oxide N.L. to develop the Yenberrie uranium discovery in the Northern Territory. All of these companies are registered in Adelaide, South Australia.

Ore from the Rum Jungle field in the Northern Territory is being treated at the plant controlled by Territory Enterprises Pty. Ltd. for the Commonwealth government. Here uranium oxide is produced directly from the ore. This is the selling point for companies and individuals who have ore shipments for purchase by the government. Under certain conditions, subsidiary plants may be erected elsewhere.

Uranium Mines N.L. and Norseman Gold Mines N.L. will form a new company to take over their activities at Lake Dundas and a second field, recently discovered—the Ravensthorpe copper field 150 miles southwest of Lake Dundas. (See MINING WORLD, March 1954, page 67.) Nine shallow trenches disclose uranium-bearing material over a length of nearly 1,000 feet. In the Dundas area there are two main prospects: In the first, two trenches 40 feet apart in brecciated granite disclose a yellow uranium mineral and there are indications that mineralization is over a large area. In the second, a high degree of radioactivity has been found over a distance of miles. Intensive exploration will be possible by the company now to be formed.

The ore at Radium Hill, South Australia is complex—containing davidite—requiring concenrtation before being converted to uranium oxide. A pilot mill now operating at Radium Hill will soon be replaced by full-scale operations. A flotation concentrate, containing titanium, iron, rare earth, vanadium, and minor impurities, as well as uranium, will be refined at a new plant being erected at Port Pirie. Expected to be in operation by the middle of the year, this treatment plant will then produce uranium oxide.



Mexican Sulphur Plant Opened by Texas Firm

Production of the first commercial sulphur on the Pacific Coast began April 1 with the opening of the Texas International Sulphur Company's processing plant near San Felipe, Baja California, Mexico. Time required for sulphur shipments to reach California from the new plant is one day, compared to the three weeks needed to transport the material from plants on the Texas-Louisiana Gulf Coasts, where 80 percent of the world's sulphur is produced.

The San Felipe plant is the only one on the North American continent now producing crude commercial sulphur from surface ore, according to Victor Dykes, president of Texas International. The autoclave process is used to extract the sulphur. The ore is stripped from the ground and loaded in perforated buckets on an overhead trolley, which carries the buckets to the two autoclaves at the plant. Steam is shot into the autoclaves and the sulphur is brought to the melting point. The melted sulphur runs out of the perforations in the buckets into vats, where it solidifies.

Initial production will be at the rate of 700 tons per month. A 40 percent sulphur return is expected from the ore, which is obtained from the San Felipe area. Texas International also holds exploratory and mining rights to sulphur concessions in the Isthmus of Tehuantepec, Veracruz, Mexico.

London Gold Market Reopens After 15 Years

For the first time in 15 years, the London gold market is again in operation. At the close of the first day's trading, the price was 248 shillings and sixpence an ounce, which is about one shilling and sixpence (21¢) under the United States official price of $35.00 per ounce.

The market will operate under the general supervision of the Bank of England and dealings will be restricted to authorized dealers. These comprise the Bank of England, all banks authorized to transact foreign exchange business, and the four specialized bullion firms—Johnson Matthey & Company, Mocatta & Goldsmith, Pixley & Abell, and Sharps & Wilkins. The actual market in gold is traditionally made by these four specialist firms, together with N. M. Rothschild & Sons and Samuel Montagu & Company (both of them authorized banks and, therefore, authorized dealers in gold), whose representatives meet daily to fix the price of gold according to the play of supply and demand.

Anybody can sell gold in the market but the only people who can buy in it are: (a) those nonresidents who can pay in American or Canadian Sterling; (b) nonresidents who hold a new kind of Sterling known as "registered Sterling" which can be acquired only against United States or Canadian dollars or against gold by someone who resides outside the "American account" area and also outside the Sterling area; and (c) residents of the Sterling area who receive special licenses from the Bank of England and who will be allowed to buy gold for trade purposes to the same limited extent as they have hitherto been permitted to buy direct from the Bank of England under the Treasury Export Scheme.

Tin Contract Approved By Indonesia and RFC

An agreement has been reached between the Republic of Indonesia and the United States Reconstruction Finance Corporation regarding the third year of a three-year contract for tin metal and tin-in-concentrate.

The price for the year starting March 1954 will be based on New York market price averages and the tonnage will remain unchanged from what it was previously—18,000 to 20,000 tons, of which 8,000 to 10,000 will be tin-in-concentrate.

New Rhodesian Firm Will Operate Copper Refinery

Roan Antelope Copper Mines, Ltd. of Lusaka, Northern Rhodesia has announced plans to construct an electrolytic copper refinery with an initial capacity of 55,000 to 60,000 long tons per year at Ndola. A new company, Ndola Copper Refineries, Ltd., has been formed by Roan to own and operate the plant.

The refinery is designed for eventual expansion to an annual capacity of 110,000 tons. Initial cost of the refinery has been estimated at £3,000,000, with an additional £1,150,000 necessary for the expansion.

Share capital for the new firm will be taken up by Roan, which has been conferring with representatives of the Ndola Municipal Council for several months concerning housing and other facilities for workers of the Ndola Copper Refineries.

Construction of the refinery will bring the number of electrolytic refineries in the Rhodesian copper belt to three. The other two are Anglo-American's Rhodesia Copper Refineries, serving Rhokana and Nchanga, and the Selection Trust electrolytic refinery at Mufulira.

Production for Roan during the last six months of 1953 was reported as 44,222 tons of blister copper.

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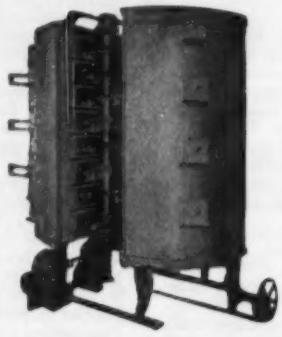

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Titanium Corp. Completing Concentrator Near Durban

Construction of the concentrator plant of the Titanium Corporation of South Africa Ltd. is nearing completion and is scheduled to begin production shortly. The plant is located on the Natal Coast near Durban, Union of South Africa.

Having carried on an intensive development program during the past three years by a grid of closely spaced shallow boreholes, a total reserve of 23,000,000 long tons reportedly have been proved, containing 2,000,000 tons of ilmenite, 170,000 long tons of rutile, and 273,000 long tons of zircon. Calculations are based on an annual production of 60,000 tons of ilmenite, 3,500 tons of rutile, and 6,000 tons of zircon.

The ore is alluvial and eluvial, and covers, in forms of sands and debris, a number of hillocks rising from 120 to 250 feet above sea level. On Ilmenite Hill, these sands reach 50 feet in thickness. Milling tests carried out on the pilot plant at Umgababa gave excellent results. The concentrates are to be exported through the Port of Durban which is located 25 miles away.

Cuban Nickel Operations To Expand with ODM Aid

Nicaro Nickel Company, which is a Cuban subsidiary of Freeport Sulphur Company, and the National Lead Company's Cuban subsidiary have received go-ahead signals for increased production from the Office of Defense Mobilization.

A certificate of necessity for $55,250,000 was issued by the ODM to the Freeport company for its mining operations at Moa Bay, Cuba. Eighty percent was allowed for rapid tax amortization.

The National Lead Company subsidiary, Nickel Processing Company, has been allocated $43,000,000 by the ODM for operation of the government-owned plant at Nicaro, Cuba. Capacity will be increased by 75 percent, or 51,500,000 pounds annually, by the program.

Expansion of the Nicaro plant is expected to be accomplished as rapidly as possible, according to Edmund F. Mansure, General Services Administration head. Subcontractors are being used for various phases of the work—engineering plans, specifications and design of expanded facilities, and construction.

New Iron and Steel Plant To Aid Peruvian Economy

Detailed plans have been completed and some preliminary construction work has been accomplished for a government plant at Chimbote, Peru which is designed to make that country self-sufficient in simple iron and steel products.

The enterprise is being financed by the government's Corporacion Peruana del Santa, backed by loans from the Bank of Paris for the purchase of French-manufactured equipment.

The plant will consist of an electric pfg-iron smelter of 200 tons daily capacity, electric steel furnaces, and rolling mills. Already a large part of the equipment and materials have been delivered at the plant site, Chimbote, which is an important Pacific port about 260 miles north of Lima. Also a considerable portion of the construction of the Canon del Pato hydroelectric power plant, planned to eventually produce 210,000 kva. for the plant and other industries, has been completed.

Since this region does not have good-quality natural coking coal, briquets of anthracite fines (from the near-by Pallasca mines of the Nicolini interests) mixed with Talara asphalt residues will be fired to obtain metallurgical coke. Arrangements with the Marcona Mining Company for the supplying of hematite ore to the Chimbote plant were made in the original lease contract of the Marcona deposit. Limestone flux is available close to the plant site.

Although fairly good progress has been made on the project, the available finances have been nearly exhausted and further loans must now be obtained if the work is to progress.

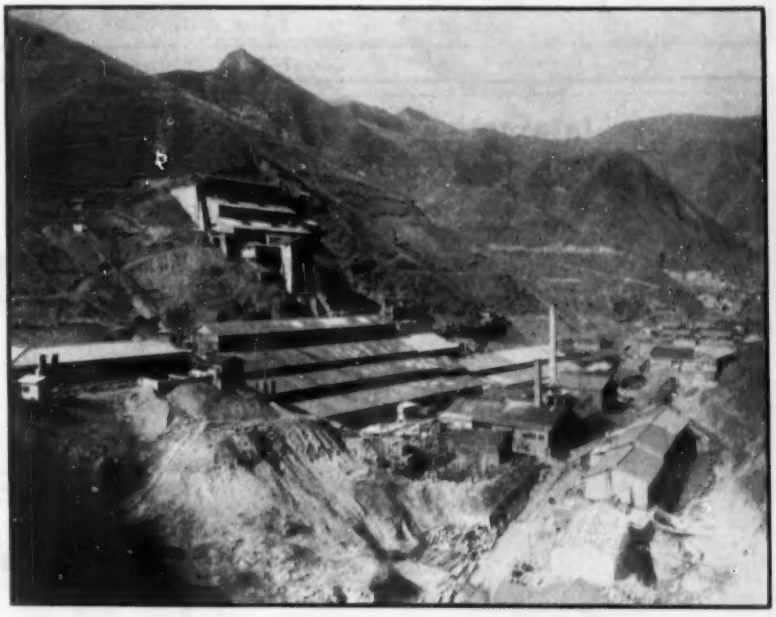
Vanadium Corp. Operating New African Chrome Mill

Operations have started at a new mill erected by Vanadium Corporation of America at its properties in Southern Rhodesia to treat eluvial and metallurgical grade chromium ore.

Through its wholly owned subsidiary, Rhodesian Vanadium Corporation, Vanadium owns extensive deposits of chrome ore in the Great Dyke region. The mill will supply concentrates for the manufacture of ferrochromium and chrome-silicon alloys at Vanadium's plants in Niagara Falls, New York and Graham, West Virginia.

TURKEY—*Stratejik Mineral Ltd.* was organized in Ankara recently by a group of experienced mining engineers, geologists, and chemists. The company has about 300 claims and operating rights for scheelite ore covering some of the most promising areas in Turkey. A private laboratory is almost completed, and construction of a small concentrating unit for scheelite will be erected this year.

THAILAND—It is reported that the Thai cabinet has approved, in principle, a proposal that a foreign firm be allowed to build and operate a tin smelter within the country. At present, Thailand has to export its tin concentrates. The Minister of Industry will study the plan further. The Premier has also instructed the Minister of Industry to draft plans for promoting mining by nationals, rather than foreign interest, and it has been suggested that foreign technicians be engaged to train Thai nationals in the proper mining techniques.



End of U. S. Contract Closes Korean WO_3 Mines

The South Korean government has ordered all of its tungsten mines to close because of the expiration of its tungsten agreement with the United States. Under contract terms, effective March 31, 1952 with production starting in April 1952, the United States guaranteed to purchase 8,750 short tons (975,000 short ton units) of 65 percent WO_3 concentrate at a guaranteed price of $65 per short ton unit. The term of the contract was five years, but deliveries were made so rapidly that the contract was completed on March 31, 1954. Appeals by the South Korean government for a renewal of the agreement have been under discussion. The Sang Deng mine (shown above) and the Dalsung mine are the country's largest producers. In 1953, Korea was the largest foreign tungsten source for the United States. Korean imports were 5,901,998 pounds of tungsten valued at $19,950,000. This constituted 21.4 percent of the United States' imports of tungsten during the year.

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INDIA—The Indian government set quotas for the export of iron and manganese ores through the port of Madras during the first quarter of 1954. Manganese and iron ores from the Bellary-Hospet and Bangalore areas were licensed on a quota basis and ores from other areas in Madras state were licensed freely. Allotments for the quarter were granted to established shippers in amounts up to 20 percent of the manganese and iron ore exported by them in any one of the years 1951, 1952, or 1953. Export license applications from mine owners were also acceptable under certain conditions. Iron and manganese ore exports through other ports continue to be regulated in the same way as in 1953.

MALAYA—*Renong Tin Dredging Company Ltd.* reports extremely satisfactory operations during the current fiscal year because the No. 2 dredge at Rasa has been passing through an exceptionally rich virgin belt of ground. Though it is not possible to say how far this rich area may extend, recent metal recoveries are considerably in excess of the original estimates based on test borings. With a production of 151 tons of tin concentrate during February (1954), total output of the first eight months of the financial year has increased to 800 tons, compared with 232 tons during the same period of last year, and 352 tons during all of last year. This means that if production is maintained during the remaining four months of this fiscal year, about 1,400 tons will be produced, which is four times that of last year.

PAKISTAN—A record chromite production was reached in 1953. Beginning with 20,365 tons produced in 1947, 62 mines are now being worked by four local companies which together produced 23,442.25 tons of chromite in 1953. Plans for modernization of mining techniques are under way, and orders have already been placed for compressed air equipment. The ore, which appears in the form of lenses, was originally mined by open pit; now these outcrops have nearly been exhausted and adits are being driven for underground mining. A large New York mining firm is reported to be showing interest in the chromite industry of Hindubagh in Baluchistan and is expected to take steps toward mineral development there this year. Hindubagh presently yields 18,000 tons of chromite annually with one Pakistan and two British firms operating there. The Pakistan Geological Department recently discovered chromite deposits in the upper Punjab Valley near Kharan.

JAPAN—Titanium production in January 1954 totaled 10.832 tons, an increase of 0.948 ton from December. A spokesman for the Titanium Association said that this output should continue upward since the trial production period is about over. An earlier report from the Association had indicated that Japan's titanium output in 1954 would be about 1,330 tons, or more than eight times that estimated for the 1953 fiscal year.

MALAYA—*Raub Australian Gold Mining Company Ltd.* has started a school to train machine miners. While in general the labor situation has improved, there is still a shortage of skilled workers. From December 5, 1953 to January 30, 1954, this firm produced 3.943 ounces of fine gold; tonnage crushed was 16,630.

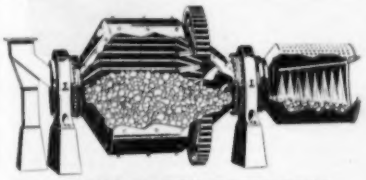
TURKEY—A new mining law was accepted in March, and regulations for its application are now being drawn up. The new edict makes it necessary for all people preparing mining claims, and for all mine operators, to engage the services of a mining engineer.

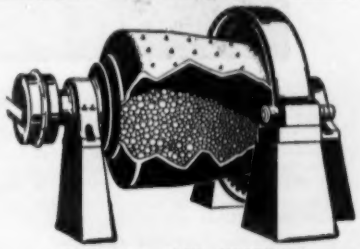
JAPAN—The Ministry of International Trade and Industry has decreased its original estimate of the amount of iron ore to be imported during fiscal 1954. About 4,960,000 tons are now planned instead of the original 5,520,000 tons. The decrease is said to be caused by a shortage of foreign exchange.

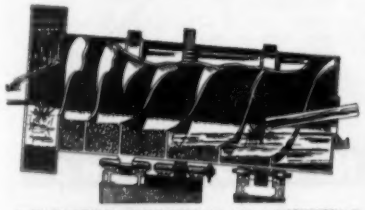
THAILAND—The Ministry of Industry has authorized 10,000,000 bahts ($500,000) for 1954 expenses in the first phase of the construction of an iron smelting plant in Kanjanaburi.

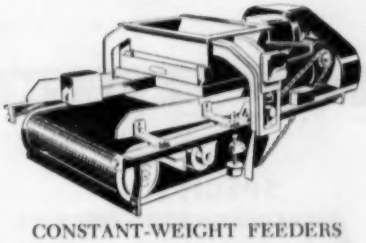
MALAYA—During the current year, the No. 6 dredge of *Petaling Tin Ltd.* will continue to operate in comparatively high-grade ground in the Puchong section. The No. 5 dredge will be dismantled and re-erected at Seaport Estate, and the No. 3 dredge will recommence operations with an increased digging depth as soon as work is completed. A lower rate of output must be expected for the time being in view of the temporary loss of production from Nos. 3 and 5 dredges.

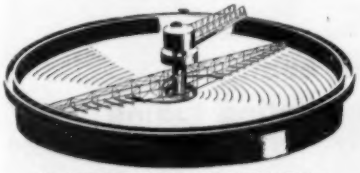
CEYLON—Ceylon Customs inspectors report that diamonds are being smuggled from Ceylon into India in exchange for gold. The smuggling seems to have increased since India banned the importing

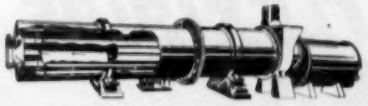

CONICAL ORE SCRUBBERS

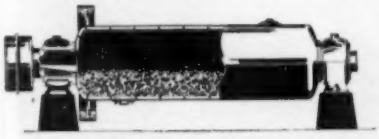

CONICAL AND TRICONE BALL MILLS


COUNTER-CURRENT CLASSIFIERS HEAVY-MEDIA SEPARATORS

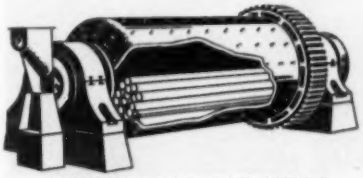

CONSTANT-WEIGHT FEEDERS


"AUTO-RAISE" THICKENERS


RUGGLES-COLES ROTARY DRYERS


CONVEX HEAD TUBE MILLS

"GYROTOR" AIR CLASSIFIERS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of diamonds. In 1952, Ceylon imported Rupees 1,300,000 worth of diamonds, and in 1953 about Rupees 2,500,000.

PAKISTAN—The Geological Survey Department has representatives investigating the area at Serwan and Petaro near Kotri for gypsum. Gypsum is presently being mined in the area, but its large-scale commercial potentialities are being investigated.

INDIA—M. A. Srinivasan, chairman of *Kolar Gold Mining Company,* gave testimony before the Taxation Inquiry Commission recently in an attempt to seek tax concessions. He pointed out the gold mining industry in Mysore State (where 95 percent of India's gold output is mined) was probably the most heavily burdened industry in India. In addition to income tax payable to the Central government, and a royalty plus an addition royalty payable to the state government, the industry had to make further payment to the state called "contribution." This amounted to a type of excess profits tax. According to Mr. Srinivasan, the "dwindling dividends" of the company reveal the "sorry state" of the Kolar Gold Fields. He said that these heavy tax burdens stood in the way of development of important new discoveries recently made in the *Nandydroog* gold mine which, with sufficient encouragement, could become one of the most valuable gold mines in the world.

MALAYA—There have been numerous rumors that Japanese trading firms were planning to form a joint South East Asia development corporation with headquarters in Singapore to mine for iron ore and other minerals in Malaya. One of the difficulties is the matter of foreign exchange; another that the Chinese and Malayans are not anxious to share any of the business and profits if they are to be had.

LATIN AMERICA

BRAZIL—*Foley Brothers, Inc.,* construction engineers of Pleasantville, New York, have been awarded a contract to develop a 135-mile jungle railroad and port facilities for *Industria e Comercio de Minerios* S.A. in the Federal Territory of Amapa. The Brazilian firm has a concession from the Brazilian government to develop the *Serra do Navio* manganese deposits. The railroad will connect the mines with the port installations on the north bank of the Amazon River near the city of Macapa. The project will take about three years.

CHILE—Work on the port of Guayacan, from which iron ore mined at the *Romeral* mine of *Bethlehem Chile Iron Mines Company* will be shipped, has almost been completed. The railroad connecting the port and mine has been graded and track structure placed; ballasting of the line should be completed this year. At the mine site, grading is nearly complete; service building construction is progressing and should be finished by the end of this year.

PERU—A geologic and scientific party from the Raw Materials Division of the United States Atomic Energy Commission is reported to be investigating the

central and southern areas of Peru for possible uranium deposits. Heading the group is Thomas L. Wells. They are working in collaboration with the National Institute of Mining Development and Investigation.

MEXICO—An initial shipment of 100,000 pounds of molybdenum concentrate has been made from the *Guadalupe* mine in the Nocozari area of Sonora state. Operators are reported to be Ben Williams and John K. Penny of Douglas, Arizona, working as the *Compania Minera Benwilco*, S.A. The shipment was made through the entry port of Douglas, with 34,000 pounds destined for Yokohama, Japan, 44,000 pounds for Marseilles, France, and 22,000 pounds for London. The mine also produces copper concentrate which is shipped to the Phelps-Dodge smelter.

BOLIVIA—The Bolivian Ambassador, Victor Andrade, has advised the United States Reconstruction Finance Corporation and the State Department that from 15,000 to 20,000 tons of tin concentrate and ore are available for sale.

BRITISH GUIANA—*British Guiana Consolidated Goldfields Ltd.* will explore a 75,000-acre columbite concession vacated by *Kennametal International* after 10 months of operation. Preliminary work by British Guiana Consolidated will be started in the Mazaruni River area, well-known as an alluvial gold and diamond hunting ground for Guianese prospectors.

VENEZUELA—During 1953, the second full year of iron ore production at *El Pao* mine, nearly 2,500,000 tons of ore were mined. Ore mined at El Pao by the *Iron Mines Company of Venezuela*, a subsidiary of *Bethlehem Steel Company*, is shipped from the deep-water port of Puerto de Hierro.

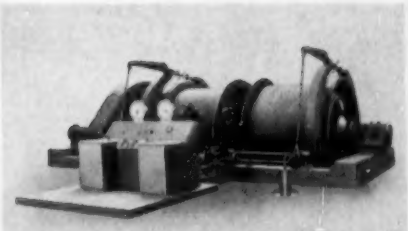
ARGENTINA—*Cia. Minera Aguilar*, S.A., a subsidiary of *St. Joseph Lead Company*, reports that it produced 19,768 metric tons of lead concentrate and 31,797 metric tons of zinc concentrate in 1953, compared with 23,064 and 30,366, respectively, in 1952. This was from the *Aguilar* mine and mill located in northern Argentina. In the southern part of the country, an extensive reorganization of staff and operating procedure was found necessary at the *Comodoro Rivedvia* zinc smelter in which St. Joe-Aguilar has a 43 percent ownership.

SURINAM—*Billiton Company* is reported to be considering the use of geochemical methods for the prospecting of asbolan (a cobalt, nickel, and copper-bearing manganese oxide) near Brokopondo on the Surinam River. Dr. G. L. Kroll, chief geologist, recently visited the firm's exploration operations. Also on the Surinam River, a local firm has started small-scale development of a beryl-bearing pegmatite.

BOLIVIA—The large nationalized mines, as well as the small mines in Bolivia, are reported to be producing metals at a cost higher than the respective selling price. The losses of the government's Corporacion Minera and the Banco Minera are covered by loans of the Central Bank. Tin production and sales values over the last years are as follows: 1951 33,600 tons valued at $93,365,000; 1952 32,400 tons valued at $84,783,000; and 1953 35,800 tons valued at $83,634,000. In a recent speech concerning mining, President Paz Estenssoro said, "This year, as we have expected, will be the most difficult. Workers, I have to ask another sacrifice of you, but it will not be in vain. You will have to suffer a little bit more." The drop in the tin price in 1953 has increased the Bolivian government's difficulties but recently many commodities and types of equipment have also dropped in price which partially offsets the low tin price.

MEXICO—Discovery of rich manganese deposits on properties that *Manganeso del Centro*, S.A. operates in the Nochistlan district of Oaxaca and from which it currently ships four railroad carloads weekly has been announced by the Ministry of National Economy's mining agency in Oaxaca City. The report added that there is something of a manganese production boom in the Nochistlan belt where there are mines at Santiago Huauclila, San Pedro Cantaros, Chachoapan, Amatlan, Perales, Santiago Ixtaltepec, and San Miguel Chicahua. It said *Cia. Minera Totocuno*, S.A. ships as many as six carloads weekly, and that *Cia. Villa Alta y Anexas*, S.A. is active but on a lesser scale. The agency also announced that Maurice Minchen, American mining man, has field applications for work rights to 15 tracts, each of 100 hectares (225 acres), in the Pochutla district, Oaxaca, to mine titanium, gold, silver and copper.

Vulcan-Denver



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QUEBEC—*The Molybdenum Corporation of America* has an option on 8,000 acres of land on the St. Lawrence River, 42 miles from Montreal. Two diamond drills are checking evidences of uranium, thorium, columbium, and tantalum. This quiet community, home of the Trappist Monks' Oka monastery, may become the newest uranium field. By the end of January, 15 major mining companies had established field headquarters in the 50,000-acre area. Some of the firms now in the vicinity include *Beattie-Duquesne Mines, Ltd., Coulee Lead and Zinc Ltd., Headway Red Lake Gold Mines Ltd., Nipiron Mines Ltd.*, and *Steeloy Mining Corporation*.

ONTARIO—In 1953, *International Nickel Company of Canada, Ltd.* mined 13,667,095 tons of ore, the highest ore production in its history, compared with 13,248,593 in 1952. Its ore production from underground, reflecting the progress of its underground mining expansion program, was 11,095,199 tons, also a new record. Proven ore reserves as of December 31, 1953 were 261,541,259 short tons. Underground development in the producing mines advanced 142,302 feet, or approximately 27 miles, compared with 132,435 feet in 1952. Total underground development in the operating mines now stands at 1,860,283 feet, or 352 miles.

NOVA SCOTIA—During the fiscal year 1953, *Mineral Exploration Corporation, Ltd. (Minex)* through its wholly owned subsidiary, *Cape Breton Metals Ltd.*, surveyed 6,146 miles of its 1,000,000-acre exploration prospecting concession on Cape Breton Island by air borne magnetometer and scintillometer. A total of 14 mineral occurrences were charted and are now under examination by ground parties. It is estimated that three more seasons of work are required to explore the area adequately and to select the most promising mineral areas in the concession. During last year, Minex also acquired control of *Goldmaque Mines Ltd.* with 13 claims in the Athabasca uranium area, Saskatchewan. The company also holds a group of 30 claims in the copper-bearing area of Albert County, New Brunswick; 36 claims in the Blind River-Algoma uranium field of Ontario; interests in Landrienne township, Quebec, and Omineca, British Columbia.

ALASKA—The first uranium strikes have been made in the Territory in two widely separated areas. Locations of the deposits are not being made public until the prospectors have had sufficient time to claim the surrounding areas. The news has aroused keen interest among local prospectors, many of whom are inquiring about the possibilities of a uranium search with a scintillometer.

NORTHWEST TERRITORIES—*Rankin Inlet Nickel Mines Ltd.* reports that its three-compartment shaft has been completed to a depth of 331 feet with the second level station cut at the 300-foot horizon. Crosscutting on both levels is underway with latest information showing that the upper crosscut has been advanced 111 feet from the shaft, and the lower crosscut 132 feet as of March 14. All underground work has been done in permafrost. For rock drilling the water must be pre-heated and at the end of each drilling cycle all pipe lines and equipment are drained. The rock temperature recorded in the second level station was 22° F. With the completion of the shaft the contract with *Temiskaming Construction Ltd.* was terminated. Operations at the property are under the direction of K. C. Wilson, manager.

MANITOBA—Recent drilling by *Hudson Bay Mining and Smelting Company* is reported to have indicated a new copper find about 13 miles southwest of Flin Flon. Two parallel veins separated by about 20 feet of lower grade material are said to occur. Reporting on its *Wellgreen* nickel-copper prospect in the Kluane Lake district of the Yukon Territory,

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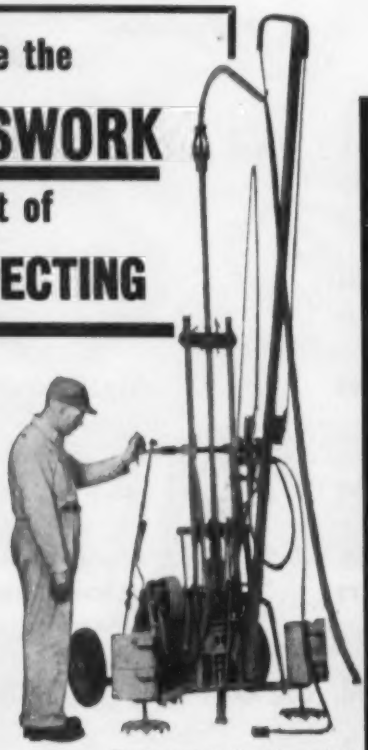

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Hudson Bay says that 257,600 tons of ore were developed by the end of 1953, with an average grade of 1.83 percent nickel, 1.14 percent copper, plus cobalt, platinum, and palladium. Gross value of the ore at present metal prices is estimated by company officials at $40 per ton.

ONTARIO—Main development work for *Leitch Gold Mines, Ltd.* in 1954 will be to open up three new levels on the main vein system. The company estimates its reserve for the end of 1953 as lower by 12,132.77 ounces than that of 1952 because development work in 1953 was confined principally to the sinking of a winze to open these three new levels. Production for the year was 32,159.653 fine ounces of gold and 961.45 fine ounces of silver, valued at $1,107,408.13. Average recovery was 0.843 ounces of gold per ton milled.

YUKON TERRITORY—During 1954 *Yukon Consolidated Gold Corporation Ltd.* will have dredges Nos. 4, 6, 8, 9, 10, and 11 in operation throughout the season. Dredge No. 12 will be operated but for a shorter period of time, as its location will probably require a later starting and an earlier closing date than other dredges. The hydraulic operation on Paradise Hill will be continued. An increased supply of water will be provided by installing a larger pump and recirculation of water. All plans for 1954, the company notes, will be conditional on labor available. An agreement has also been made by the company with *The Consolidated Zinc Corporation of Canada Ltd.*, a subsidiary of *The Consolidated Zinc Corporation Ltd.* of London, England, for an association in the field of base metal exploration in Canada. Exploratory and examination work will be undertaken by the organization set up by Consolidated Zinc with head office in Montreal. Yukon will contribute to the cost of the work.

QUEBEC—The *Iron Ore Company of Canada's* 360-mile railroad has reached Schefferville (formerly Knob Lake) in Labrador almost a year ahead of the original schedule planned in 1950. About 130 miles of ballasting remain to be completed in Schefferville, and then the railroad is expected to take over moving of supplies which until now had been flown in by the company-owned *Ungava Air Transport*. By the end of summer, rail transport is expected to have completely taken over all shipments. Installation of handling equipment at the terminal point on the north shore of the St. Lawrence River (Seven Islands, Quebec) is proceeding ahead of schedule. The company hopes to load the first ocean-going freighter at Seven Islands before the end of summer.

BRITISH COLUMBIA—The low prices for lead and zinc were considered to be responsible for the closure of 45 mines in the Nelson, B.C. mining district. The number of operating mines in 1953 dropped from 75 at the beginning of the year to 30 at the end; employment reportedly dropped from 1,500 to 650. In 1952 there were 105 active mining operations in the district. Ten zinc-lead milling plants with a capacity of more than 4,000 tons of ore daily were closed during 1953; four new milling operations were started, leaving 10 concentrators still running at year's end.

ALASKA—The newly formed *Seldovia Chrome Company* is reported to have made shipments of chromite to the United States government's purchase depot at Grants Pass, Oregon during the winter. This operation has developed rapidly for the deposit was found to be minable only last fall, and work had to be conducted under difficult winter conditions. The deposit is located in the Red Mountain area of Kenai Peninsula. Ore will be transported to Seldovia by tractor for further shipment by water.

NEWFOUNDLAND — *Newfoundland Asbestos Ltd.* plans to begin construction of a 100-ton mill in the spring, following completion of a two-mile stretch of road into the property at Port au Port Bay. Development work from two adits has indicated a small but reportedly rich chrysotile asbestos body. Walter E. Siebert of New York is president.

BRITISH COLUMBIA—*Pioneer Gold Mines of B.C., Ltd.* has opened a 5½-foot quartz vein of above-average grade ore on its new 26 level in the Bridge River district. The level is on the first of four new levels to be opened from a new shaft.

QUEBEC—*Eastern Metals Corporation* reports it has tapped the north nickel ore body on the second level and work is now going forward in opening up this zone already developed on the first and third levels. Major development efforts, however, are being directed toward developing the larger tonnage known to exist in the copper-nickel-pyrite replacement ore body to the south on the first, second, and third levels. Douglas Parent has been appointed mine manager. He was formerly with *Anacon Lead Mines* in the same capacity. He is directing mine preparation development, and the construction of the proposed 1,000 to 1,500-ton daily capacity concentrator.

UNION OF SOUTH AFRICA—The location of a deposit of high-grade iron ore in the Vanrynsdorp district of the Northwestern Cape has been reported. The State-controlled *South African Iron and Steel Corporation (ISCOR)* is under-

Southwest Alaska AIME Meet Draws Record Crowd

The fifth annual banquet of the Southwestern Alaska section of the American Institute of Mining and Metallurgical Engineers was held March 5 in Anchorage, Alaska. Principal speakers and participants are pictured above. Left to right, standing: W. E. Dunkle, veteran Alaskan mining man; L. G. Anderson, U. S. Bureau of Mines at Anchorage; Dr. E. N. Patty, president of the University of Alaska; W. Sorensen, Decoursey Mountain Mining Company; S. H. Lorain, director of Region I, U.S. Bureau of Mines. Seated: W. A. O'Neill, Alaska Oil and Development Company; L. H. Soarela, United States Geological Survey, chairman of the meeting; H. Strandberg, Fairbanks Engineering Company; and Philip Holdsworth, Territorial Commissioner of Mines. Dr. Patty, the guest speaker, cited for the need for a policy similar to the Canadian law which would exempt new mines from income taxes for 3½ years to encourage exploration. Also urgently needed is development of the immense hydroelectric potential near Tidewater in Alaska to benefit the Pacific Coast mineral industries. A major deterrent to exploration, according to Mr. Holdsworth, has been the lack of clear title to mineral lands. The Department of Mines is now the central recording office and full information is available there. He reported that a list of all known mineral deposits in Alaska, started by the United States Geological Survey in San Francisco, California, is being completed by the Territorial Department of Mines and will be available to the public in the fall. Mr. Lorain, speaking for the U. S. Bureau of Mines, complimented the Defense Minerals Exploration Administration for having made possible the development of Kenai chrome, and Lost River tin mines.

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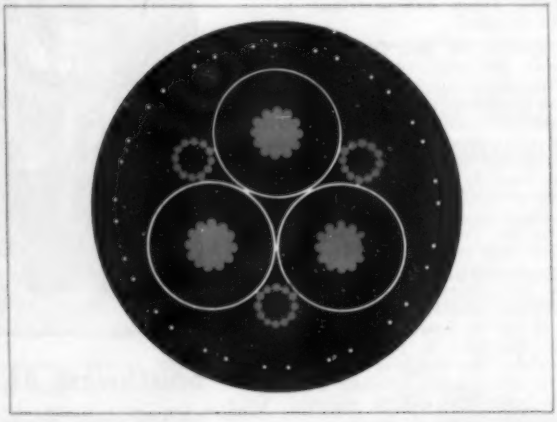

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stood to be negotiating for the purchase of the deposit.

TANGANYIKA—Diamond production in 1953 totalled 170,679 carats, valued at £2,100,000. Gold exports of 69,886 fine ounces valued at £904,000 were 5,193 ounces higher than during 1952. Exports of lead concentrate by *Uruwira Minerals* from its pilot plant at the *Mpanda* mine were stepped up from 4,837 tons to 6,075 tons valued at £472,000. At the *Williamson* diamond mine a new plant is in process of erection and it is expected that 7,500 tons of diamondiferrous gravel will be handled during 24 hours. The plant is scheduled to go into production about the middle of this year.

GOLD COAST—*Ariston Gold Mines* announces that its February return constituted a high record for tonnage and revenue and that the present labor force is now adequate. The new hoist should be in operation by August when there should be a progressive increase in crushing until the anticipated 40,000 tons a month is reached.

BELGIAN CONGO—Tin producers of the Belgian Congo and Ruanda-Urundi are stockpiling 1,635 tons of tin concentrate in advance so that when the Geneva Tin Agreement providing for a buffer pool goes into effect their contribution will be ready. Government loans are making this stockpiling possible; however, the Colonial Council points out that this action does not necessarily mean that the Belgian government will ratify the agreement. The question is still under discussion.

SWAZILAND—Initial results of drilling started on an iron ore occurrence at Gege, Mankaiana district, have shown low-grade siliceous ore, 34 percent iron and 46 percent silica. The width is considerable, 20 feet or so, and the strike reportedly persists for miles. Iron ore bodies of the Pongola System in south and southeastern Swaziland appear to be ferruginous concentrations in shale and quartzite bands, in places metamorphosed to pyroxene-garnet-magnetite rocks when they occur in proximity to the intrusive granite. Investigation of iron and coal deposits continues; also under way is a survey of hydroelectric and irrigation potential of the Great Usutu River and its principal tributaries.

SIERRA LEONE—The chairman of *Consolidated African Selection Trust* has reported that the production of diamonds suffered very seriously last year from the full impact of illicit mining and theft, and that the value of sales during the year were reduced by about £430,000 as a result. He also says that the Sierra Leone government is collaborating wholeheartedly in efforts to combat these problems, with some measure of success.

NORTHERN RHODESIA—Because of water difficulties encountered in development from the Main North Shaft of the *Kashanshi* copper mine, *Rhodesia-Katanga Company Ltd.* has decided to suspend exploration from this shaft. There still appears to be no connection between water encountered in this shaft and that encountered in the Main South Shaft workings; therefore, for the time being, it has been decided to continue with opening up of the Main South area where water is more under control. Officials report that it is impossible to assess the potential value of the Kashanshi property until all development work has been completed. The period of option expires December 31, 1955.

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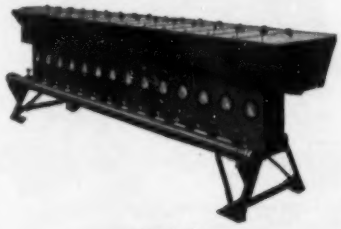

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UNION OF SOUTH AFRICA—Initial production of uranium at the *Randfontein* mine on the West Rand started in February when the pumping of residue slimes from the *East Champ d'Or* mine to the uranium plant was also started. The East Champ slimes are being delivered to the Randfontein uranium plant at the rate of 20,000 tons a month through a 6-inch pipeline.

NORTHERN RHODESIA—At *Mufulira Copper Mines, Ltd.*, an increasing proportion of the ore is coming from the block-caving sections of the mine. The mine and mill capacity will be increased in 1956 to about 340,000 tons per month from the present rate of about 285,000 tons by changing to mass caving of the three ore bodies, completing of a new hoisting shaft, and extensions in the mill. The program of expansion also includes the installation of a third reverberatory furnace in the smelter and additions to the refinery.

UNION OF SOUTH AFRICA—Construction of the reduction and uranium plants by *Harmony Gold Mining Company Ltd.* is proceeding at a pace which indicates that gold production should start in July and uranium production a few months later. In the *Harmony* mine, the No. 3 shaft has been completed to a final depth of 5,380 feet; the shaft has been stripped preparatory to installation of permanent equipment; and the main haulage level from the ventilation shaft holed through to No. 3 shaft.

ANGOLA—*Sociedade Mineira de Malange* is reported to be presently producing about 30 tons of manganese per month from its six claims located near the Luanda-Malange Railway. The firm has applied for full mining concessions covering these claims, and intends to develop the deposit when it has obtained investment capital. The area is said to be adequately served by roads.

NIGERIA—*Ex-Lands Nigeria Ltd.* has acquired leases on certain tin-bearing areas known as the "Dress Areas," located near the company's present properties. The *Gold & Base Metals Mines* of Nigeria are reported to be the sellers but no information has been made available regarding the value of these areas. Payment for the leases is reported at £31,500, including existing plant and machinery. Production of tin concentrates can be expected to increase from 579 tons in January to November 1953, to 900 tons during the current year, and 1,000 tons in 1955, says the firm.

QUEENSLAND—The copper smelter at *Mount Isa Mines, Ltd.* resumed production during the last week in February after operations had been suspended for about a month because of a breakdown in equipment. Output during that week totaled 370 tons of blister. The company hopes to produce 1,800 to 2,000 tons per

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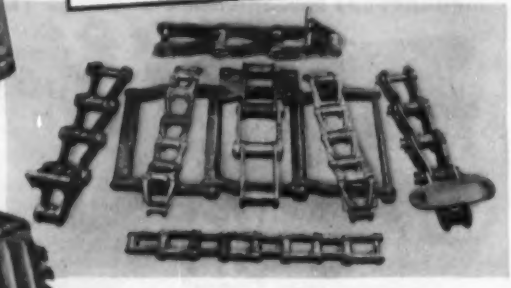

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month during the remainder of the financial year.

NEW SOUTH WALES—State mineral output for 1953 was as follows: antimony, 622 tons; copper, 3,724 tons; gold, 26,718 ounces; lead, 219,630 tons; silver, 8,021,612 ounces; sulphur, 170,246 tons (in zinc concentrate and pyrite concentrate); tin, 324 tons; tungsten, 127,380 pounds WO_3; zinc, 190,630 tons. These figures represent good percentage increases over 1952 in the case of lead, silver, tungsten, and zinc (respectively, 26.6 percent, 18.7 percent, 62 percent, 29.1 percent).

PHILIPPINE ISLANDS—Recent tests made by *Pan Philippine Corporation* have indicated that molybdenum is present in the copper deposit at Lobo. These tests have been carried out since the examination made of the property by the Philippine Bureau of Mines, and samples show that the molybdenum content persists in various places in the mine. Many of the pulps of the samples taken by the Bureau are now being re-assayed for molybdenum and so far the findings are favorable. An official report on the work is expected shortly.

NEW SOUTH WALES—The recently formed *New England Antimony Mines N.L.* reports that a winze below the 200-foot level has been deepened to 68 feet in high-grade ore 4 feet wide. The mine is near Hillgrove, a former important area for antimony, and other metals. At Evans Head, *Titanium Minerals Ltd.* reports that results of seven test bores put down by *Austral Malay Tin Ltd.* on the company's property disclosed satisfactory gold and tin values. Boring is continuing. Leases at Tallebung, near Condobolin, are being mined for tin, gold, wolframite, copper, and other metals by *Tallebung Tin Mining Company, Ltd.* which was recently formed for this purpose at Sydney.

QUEENSLAND—*Pine Vale Mines Ltd.* has been registered in Brisbane to develop the *Pine Vale* copper mine near Mackay. 12,000 tons of ore are reportedly already blocked out. Some of this is bornite running as high as 25 percent copper.

SOLOMON ISLANDS—Geological surveys were carried out during 1953, and there are reports of possible opening of manganese deposits.

SOUTH AUSTRALIA—A contact sulphuric acid plant now under construction at Port Adelaide will produce 100,000 tons per year. It is expected to start production by the end of 1954. Raw material will be pyritic flotation concentrate from Nairne, which will be flash roasted. The Tariff Board is to study the bounty required by manufacturers who use Australian pyrite or waste flue gases in making acid, with a view toward protection against the lower cost of imported elemental sulphur. At Port Pirie, the new acid plant of the *Broken Hill Associated Smelters Pty. Ltd.* has started operations. It is using imported sulphur, but will eventually change to Dwight-Lloyd gas. Capacity is 50 tons of acid per day.

QUEENSLAND—*Tableland Tin N.L.* at Mount Garnet is now producing 44 tons of concentrate per month from 200,000 cubic yards treated. This is an increase of nearly 50 percent over recent returns but it is understood that further increases in grade of gravel are anticipated.

U.S.A. Metal & Mineral Prices

METALS

April 27, 1954

COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	30.00¢
	Lake. Delivered, destinations, U.S.A.	30.00¢
	Foreign Copper. Valley basis	29.75-30.00¢
LEAD:	**Common Grade.** New York	14.00¢
	Tri-State Concentrates, jig, flotation 80% lead, per ton, Eagle-Picher	$169.85
ZINC:	**Prime Western;** F.o.b., E. St. Louis	10.25¢
	Prime Western; Delivered, New York	10.75¢
	Tri-State Concentrate, 60% zinc, per ton Eagle Picher	$64.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	21.50¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	29.00¢
BISMUTH:	(in ton lots) price per pound	$2.25
CADMIUM:	**Sticks and bars.** 1 to 5 ton lots (Price per pound)	$1.70
COBALT:	**97-99%,** keg of 550 pounds (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$75.00
MAGNESIUM:	**Ingots (99.8%).** F.o.b. Freeport, Texas	27.00¢
MERCURY:	**Flasks.** Small lots, New York	$225.00-$227.00
NICKEL:	**"F" Ingots (5 pounds).** F.o.b. refinery,, Port Colbourne, Ontario	60.00¢
TIN:	**Grade A Brands.** New York (Price per pound) Prompt delivery	95.75¢
TITANIUM:	**99.3%** + (Price per pound)	$4.72
GOLD:	United States Treasury price	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90½¢ per ounce
	Foreign Handy & Harman	85.25¢ per ounce
PLATINUM:	**Per Ounce**	$84.00-$87.00
ZIRCONIUM:	**Powder,** 100 pound lots, per pound	$7.00

ORES AND CONCENTRATES

BERYLLIUM ORE: **10 to 12% BeO.** F.o.b. mine, Colorado ..... $47.00 per unit
Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.

CHROME ORE: F.o.b. railroad cars eastern seaports. Long tons dry weight.
African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio ..... $44.00-$46.00
African (Transvaal). 48% Cr_2O_3. No Ratio ..... $32.00-$33.00
Turkish. 48% Cr_2O_3. 3 to 1 chrome-iron ratio ..... $52.00-$54.00
U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lumpy ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.

COLUMBIUM-TANTALUM ORE: At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus.

IRON ORE: Lake Superior. Per gross ton Lower Lake Ports
Mesabi, Non Bessemer, 51.5% Fe. Second quarter $9.90
Mesabi, Bessemer, 51.5% Fe. Second quarter $10.05
Old Range Non Bessemer. Second quarter $10.15
Old Range Bessemer. Second quarter $10.30

MANGANESE ORE: **Swedish,** Atlantic Ports, 60 to 68% Fe, Contracts, Per Unit ..... 22.00¢
Metallurgical grade. 46 to 48% Mn. Long ton unit ..... $1.05-$1.07
Chemical grade. 80% MnO_2. Per ton $70.00
Domestic U. S. Government are purchasing depots: Deming, New Mexico; base price $2.30 per long dry ton unit of recoverable manganese less handling and treating costs. Wenden, Arizona; base price of $8.54 per long dry ton of 15% manganese ore. Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore. Phillipsburg, Montana base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.

MOLYBDENUM CONCENTRATE: 90% MoS_2 F.o.b. Climax, Colorado. Per pound of contained molybdenum, plus cost of containers $1.00

TUNGSTEN CONCENTRATE: **Domestic.** 60% WO_3 Per short ton unit ..... $63.00-$65.00
Foreign. 65% WO_3 Per short ton unit (Scheelite) $29.00
Foreign. South American, Spanish, Portugese ..... $28.-$29.00

URANIUM ORE: **Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado. Salt Lake City, Marysvale, Thompsons, Moab, and Monticello, Utah. Shiprock, New Mexico, Edgemont, S. Dakota. Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ores purchases. At Shiprock all ores with more than 6% lime are penalized for excess lime.

VANADIUM ORE: **Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello and Shiprock. ..... Per Pound V_2O_5, $0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade.** 70% effective CaF_2 content per short ton F.o.b. Illinois- Kentucky mines	$42.50
	Mexican. 70% f.o.b. border	$30.00
	European, Atlantic Ports, 70%	$37.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$60.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

April 24, 1954

		Per Long Ton	USA Equivalent cents per pound[1]
COPPER:	**Electrolytic, spot**	£245 0s 0d	30.62¢
LEAD:	**Refined, 99.97%**	£93 10s 0d	11.69¢
ZINC:	**Virgin, 98%**	£79 15s 0d	9.97¢
ALUMINUM:	**Ingot, 99.5%**	£156 0s 0d	19.50¢
ANTIMONY:	**Regulus, 99.6%**	£210 0s 0d	26.25¢
TIN:	**Standard, 99.75%**	£74s 0s 0d	93.12¢
TUNGSTEN:	**Long ton unit, 190 equivalent to**		$26.00

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N.Y.

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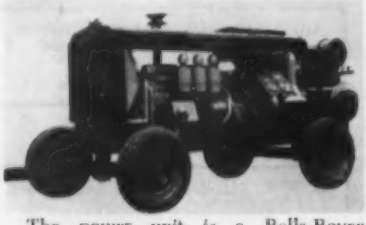
PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill, or smelter. This PEP section is MINING WORLD'S way of making available to you some of the finest current information on mechanization.

Portable Compressor Has Rolls-Royce Power Unit

The CP Model 315 is the first portable air compressor in the world to be built with a Rolls-Royce power unit. The compressor, made in England by the Consolidated Pneumatic Tool Co., Ltd., is now in regular production. The actual capacity of the plant is 315 cfm. at a maximum working pressure of 125 lbs. per square inch.

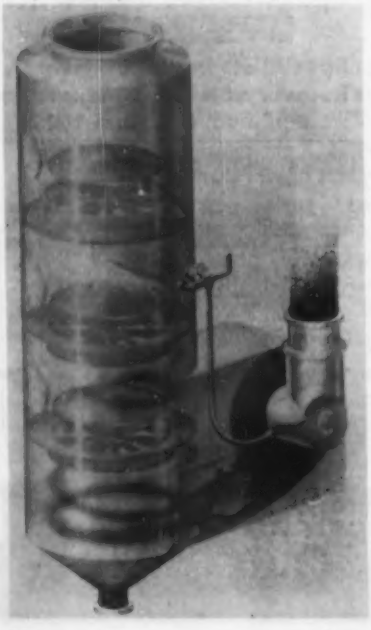


The power unit is a Rolls-Royce C6NFL 6-cylinder oil engine of 93 brake horse power at 1,250 rpm. (12 hour rating) fitted with C.A.V. fuel pump and C.A.V. multi-hole atomizers. It has dry sump lubrication and 24-volt electric starting. All gauges and switches are conveniently placed on one panel.

The compressor with the Rolls-Royce engine is available outside the U. S. only. Circle No. 65 for further information.

Ducon Dust Collectors Save Valuable Materials

The UW-3 Centrifugal Wash Collectors, made by the Ducon Co., combine exhauster and precipitator components. They have been extensively used to control dust and fumes and to reclaim valuable materials. Such difficult dusts as carbon black, limestone, pigments, and glazing particles have been handled by these collectors with efficiencies of over 99 percent by weight. Many industries have found that savings in reclaimed materials have often paid for the equipment in a short time.



A technical brochure on the Ducon UW-3 Wash Collector describes, with text, pictures and charts, the principles of its unique two-phase system and illustrates the Collector in various applications. A complete chart of pertinent data is given on the last page. Bulletin W-7053 will be sent to you if you circle No. 71.

Diesel-Electric Car Cuts Haul Time

Powering a shuttle-car with a Diesel-driven generator instead of batteries has helped provide a faster hauling operation for a gypsum mine near Grand Rapids, Michigan. The unit operates 100 feet below the surface and is used to move broken ore to a portable rock crusher located at the base of the mine shaft. The vehicle is operated by three electric motors which receive a constant, full-volume supply of current from the Diesel-driven generator. The usual power lag, common to battery-operated units after five or six hours operation, is eliminated. The new car negotiates grades up to 12 percent in the mine as fast at the end of the shift as at the beginning. The car is manufactured by the Jay Manufacturing Co. Power is provided by a General Motors Series 71 Diesel engine and a 250 volt DC Reliance generator. A separate electric motor turns each of the rear wheels and the car conveyor. For complete information on this Diesel-electric shuttle-car, circle No. 62.

Tough Air Hose Resists Weight of Freight Car

Even a freight car can run over the B. F. Goodrich Co.'s wire braid "Commander" without damaging it. For the test, the hose was filled to 400 psi. air pressure; and the freight car wheel failed to cut, abrade, or permanently distort the hose. There was no loss of air pressure.

After this test, the same length of hose withstood a laboratory burst test up to 4,300 pounds pressure—a ten-to-one safety factor as the hose is recommended for 400 pounds working pressure. When the hose finally failed in the laboratory under extreme pressure, the failure did not occur in that part of the hose which had been under the freight car wheel.

According to B. F. Goodrich development engineers, Commander air hose is designed for rugged service in mines where high working pressures are required or where the hose cover is subjected to severe abrasion. Circle No. 60 for further information on the "Commander."

FLAME SPECTRA CARD: A pocket-size card which carries emission spectra for 36 of the most typical elements determinable by modern flame spectrophotometry has been made available by Beckman Instruments, Inc. The card is designed as a handy reference for the flame analyst and for chemists interested in this new analytical technique. Emission lines are superimposed on a full-color spectrum from 300 to 900 millimicrons. This card presents for the first time results of basic research in detection of elements by flame spectrophotometry. Your card may be obtained by circling No. 6.

ROOF BOLTS FOR THE NORTHWEST: Bethlehem Pacific Coast Steel Corp. has announced that the company has started the production of mine roof bolts at its Seattle plant. These bolts, which are slotted on one end and threaded on the other, have been recommended by the U. S. Bureau of Mines as a roof control measure in mines. For more information on Bethlehem Roof Bolts, circle No. 7.

SPECIAL MILL FOR WO$_3$ ORE: Black's tungsten mill is designed to grind tungsten ore which will free the values in the range of a 12-mesh screen. A specially designed crushing chamber is used with a choke feed to give an interparticle grind, breaking the rock at the weak point which is the scheelite crystal. The ore is then immediately screened—the oversize returned for the re-grind and the undersize going to a concentrating table. This mill is of welded steel construction and all parts are properly stress relieved before machining. Black's Machine Shop will gladly send you further details. Circle No. 8.

TEFLON FILTER CLOTH: The National Filter Media Corp.'s Teflon Filter Cloth offers high service temperature and chemical inertness. It is attacked only by flourine gas, molten alkali metals and tri-chlorine flouride. It can find important applications in severe liquid filtration or dust collection where other types of cloth have one or more limitations. Circle No. 9 for more information.

HOW JAW CRUSHERS WORK: Cut-a-way illustrations and exploded drawings, accompanied by full information, are featured in Bulletin No. 1124 describing Traylor "M" Jaw Crushers. The 24-page booklet also gives all the capacities and power requirements as well as charts and tables. Circle No. 40 right now for your copy.

COUNTER HAS 8 RANGE SETTINGS: A portable scintillation counting survey meter, made by R-C Scientific Instrument Co., Inc. has 8 range settings, giving full-scale readings from .05 mr/hr. to 500 r/hr. Shock-proof and watertight design make the instrument suitable for field use. The standard probe is designed for gamma detection. Snap-on phosphors for alpha, beta, or neutron counting are available. Circle No. 10.

NEW HARD FACING DEVELOPMENT: Wear-Arc "Super WH" Electrodes, a product of the Alloy Rods Co., are an entirely new development in the welding and hard facing of manganese steel. The core wire used contains approximately 33 percent alloy, balanced in proportions new in a hard facing electrode. The electrode has a carbon content of only 0.35 percent, which according to officials of Alloy Rods, prevents spalling and flaking of the weld deposit. Circle No. 11.

ELECTRONIC SIGNAL FOR BINS: Accidental overfilling or emptying of bins and other storage units can now be prevented automatically by an electronic signal device developed by Hewitt-Robins, Inc. The new instrument, called the Robintronic Level Indicator, uses a radio signal to indicate and control the level of stored material. It is expected to find widespread use in the handling of ore, sand, gravel, and other bulk material. Circle No. 12.

SELF-CLEANING BITS: The spiral self-cleaning bit with carbide inserts, made by Carlton Forge Works, automatically cleans all cuttings away from the bit as it drills the hole. Removal of cuttings is a factor which determines drilling speed. The spiral prevents bit and steel from binding, getting stuck, or clamped in the hole; and also serves to insure that the bit remains in perfect alignment. Circle No. 13.

PORTABLE GASOLINE ROCK DRILL: The Pionjar, distributed by Larson and Co., operates entirely independent of outside power sources. It is driven by a built-in, air cooled single-cylinder, two-stroke gasoline engine. Pionjar's light weight, 86 lbs., fully equipped, makes it easy for one man to carry it in rough country and it fits in the luggage compartment of any car. Angle and horizontal drilling are made possible by a floatless carburetor. It drills to a depth of 13 ft. and cleans the hole as it drills. Hollow drill steel with tungsten carbide chisel bits are used in the drill. Literature is available. Circle No. 14.

CONTINUOUS RECIRCULATION PUMP: The HYPRO Model 4300 bronze pump, made by Hypro Engineering, Inc., is designed for continuous water recirculation use. It has permanently lubricated ball bearings and a pressed fit of the stainless steel shaft into the inner ball bearing race to restrict lateral movement of the scoop rotor, minimizing end thrust wear within the pump. A breakdown performance test with water was conducted for 5,000 hours at 40 lbs. pressure, and the test indicated no measurable wear in the Hy-Car rubber rollers or the pump. Circle No. 16 for additional information.

SPARK-RESISTANT CHAIN HOIST: The Ampco one-ton chain hoist, made by Ampco Metal, Inc., was developed to meet the demand for a non-magnetic, spark-resistant hoist for use in locations where standard chain hoists constructed of ferrous material have proved unsuitable. The hoists are recommended for use in hazardous areas where a spark might cause an explosion and where corrosion might result from direct contact with liquid or fumes. Circle No. 17.

OPEN BOWL SCRAPERS: A complete line of four new open bowl tractor-drawn scrapers has just been introduced by Wooldridge Mfg. Co., providing a heaped capacity range from 10.5 to 25.0 cu. yds. (8.03 to 19.12 m^3). Low center of gravity, high ground clearance, wide apron opening, latest application of the "boiling bowl" loading principle, and positive full power forward pivot-tilt ejection are said to be among principle design characteristics. Circle No. 18.

LIGHT WEIGHT DRAGLINE BUCKET: A light weight dragline bucket has been developed with lip and toothpoints cast of high manganese steel for maximum resistance to wear and shock. The unusually sharp teeth, mounted in bases cast integral with the thin but strong cast lip, enable every pound of the weight to penetrate and cleanly dig. The Page Engineering Co. will send further information on this bucket if you circle No. 19.

WIRE HOLDS FLEXIBILITY: The slipper compound on Anaconda's type TW wire won't dry out or deteriorate with age and holds its flexibility. It is highly resistant to moisture, oils, and most chemicals. The type TW wire is available in sizes from No. 14 Awg to 2,000 Mcm. Circle No. 41.

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MINE VENTILATION CATALOG: Just off the press, Catalog 54 describes the products of American Brattice Cloth Corp. A 12-page section gives facts and figures concerning its Mine-Vent flexible ventilation tubing for secondary mine and tunnel ventilation and describes equipment for suspending the tubing and coupling it. Other sections describe ABC Brattice Cloth, ABC Powder Bags, and ABC Inflatable Brattices which are used in temporary stoppings. Copies are available by circling No. 20.

PLAT-O CONCENTRATING TABLE: A bulletin on the new Deister Plat-O Ore Concentrating Table has been released by Deister Machine Co. Bulletin No. 36 gives full details on the three types of Plat-O Tables, including the latest improvements as applied to the Triplex Plateau Sand Table, Single Plateau Fine Sand Table, and Single Plateau Slime Table. Circle No. 21.

TAPE MADE OF MIRACLE FIBERS: The toughest miracle fibers recently developed by science are used in this new tape made by the Lufkin Rule Co. The Hi-Line non-metallic woven tape has great dimensional stability—even after it is repeatedly soaked and dried. The markings are protected by coatings of specially compounded plastic that is resistant to abrasion, cracking, mildew, moisture, and temperature changes. A four-color folder describing the Hi-Line and listing length, markings available, and prices, can be obtained by circling No. 22.

EXPLOSIVOS Y PRODUCTOS ATLAS: This is the title of a 48-page book and catalog printed in Spanish by the Atlas Powder Co. Specific aid is offered in the selection of industrial explosives for underground and strip mining, seismic prospecting, pipelining, and several other applications. The two-color file-size book includes more than 80 illustrations and more than a score of tables. The complete index includes over 150 items. Circle No. 23 for your copy.

PROSPECTOR MODEL CONCENTRATOR: A compact portable unit, complete with grizzly, pump, and engine (gas or electric, optional) is available from the Stephan Corp. The unit has the outstanding features of the larger concentrators and is an extremely useful tool for accurate handling of material from test holes. It is excellent for small, one or two man operations. For more information on the Prospector Model (P-1), circle No. 2.

FLUORSPAR BULLETIN: One of the newest and largest "acid grade" fluorspar plants is described with data, photographs, and a flowsheet in a new Engineering Notebook Bulletin published by Denver Equipment Co. For your copy of Bulletin No. M4-B69 circle No. 27.

BUCKET ROCKING ACTION combined with the 4-wheel drive traction of the Le Roi-Transo 1½-yd. loader results in full loads. An 8-page bulletin employs a liberal use of photos and sketches to point out the many features found on the loader. Circle No. 34.

INDUSTRIAL AIR CONDITIONER: Dravo Corp. has designed and developed the Pulpit Air Conditioner for use in industrial control areas where heat, dirt, or fumes create hazardous working conditions. Bulletin No. 1307 lists all the mechanical features of the conditioner. Circle No. 38.

CUT EXPLORATION COSTS: The United Geophysical Co. has developed a truck mounted magnetometer ideally suited for structures encountered in the mining field. United makes this new unit available to the mineral industry on a contract basis, and furnishes skilled engineering and interpretive service with each survey. A continuous recording device charts field intensities in view of the operator. Cost per mile is lower than airborne surveys, and on-the-spot-location when anomolies occur, permits close control for later surface ties. For more information, circle No. 1.

STANDARDIZED EQUIPMENT: The importance of standardizing equipment, and how to obtain profits from such a move is discussed in an eight-page booklet by Caterpillar Tractor Co. The booklet (Form D407) contains photos of the complete line of Cat equipment available to pit and quarry operators. Cat Diesel engines, track-type tractor shovels, bulldozers, rubber tired earthmovers, motor graders, and four-wheeled scrapers are shown in actual job applications. Circle No. 15.

NON-CORROSIVE REAGENT FEEDER: The Clarkson Model E Feeder is made of the rigid unplasticized form of polyvinyl chloride. It offers complete corrosion resistance for acids in all strengths and other corrosive liquids. The gear-motor is totally enclosed and operates with moderate temperature rise even at high altitudes. Bulletin 541 describes the Model E Feeder. Circle No. 3 for your copy.

CUSTOM-DESIGNED FIRST AID: Bullard First Aid Kits are "custom-designed" to meet the individual accident patterns of every industry. Its First Aid Catalog contains complete information and photographs of 16 different types and styles of Bullard "Safety Green" kits. An entire page of 70 different Unit First Aid Packs is included so that any combination desired can be picked with ease. Circle No. 25 for your copy.

NEW COOLING TOWER DESIGN: The Santa Fe Tank and Tower Co. has taken an aggressive step toward developing a cooling tower with a substantially improved construction design. The newly designed tower is said to require fewer parts for construction, is faster to erect, and requires less maintenance. The MD-54 tower is the result of a series of laboratory and field tests that measured all performance factors in relation to its new structural features. Circle No. 29 for full details.

FLAMEPROOF MINE LOCOMOTIVES: The Hunslet Engine Co. Ltd. of England has introduced a fifth standard model of fully-flameproof mine locomotive for underground service. The locomotives are 45 hp., weigh 5 tons, have a 2,800 lb. tractive effort, and 10 mph. top speed. The four other Hunslet standards are 21, 65, 70, and 100 hp. Circle No. 33.

DIESEL CATALYTIC EXHAUST UNIT: The Dieseler, made by Oxy-Catalyst, Inc., is a twin-flow assembly containing eight catalytic sections in a heavy-gage steel shell. Each catalytic unit is a compact porcelain structure containing 73 slender porcelain rods that are coated with the catalytic agent—alumina and platinum alloy. As the hot engine gases flow across these rods, they are catalytically burned to carbon dioxide and water vapor. Unlike other equipment for removal of exhaust hazards, the Dieseler has no moving parts, no chemical solutions, and does not require periodic maintenance. Circle No. 35.

SPUN-FIBER NYLON FILTER CLOTH: Filtration Fabrics Division of Filtration Engineers, Inc. announces a new weave of spun nylon filter cloth that has solved many cloth blinding problems. Designated FEON No. 287, the new cloth is less expensive than many other nylon weaves, increases the filtering efficiency of rotary filters, saves "down-time" for washing up or changing cloths, and makes all the long-life advantages of nylon available for many new applications. Circle No. 39.

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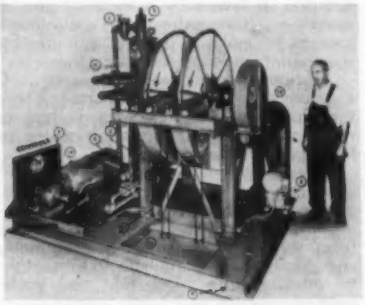
New Packaged Filter Unit Mounted on Single Base

All dewatering elements have been mounted on one base in the new complete Denver Filter Unit. The use of a wet vacuum pump has eliminated the moisture trap with all the extensive overhead piping. This packaged filter unit is a real space-saver.

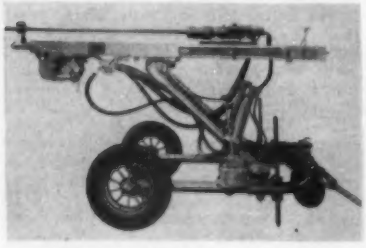


Other outstanding features of the unit include a sediment trap to protect the wet vacuum pump, one convenient control panel for all motor switches, and a hole in the base directly below the discharge scrapers which allows the unit to be mounted directly over the bin without need of a chute or conveyor.

Further details on Denver Equipment Company's packaged filter unit are available by circling No. 76.

Cut Hole-Spotting Time With URM Wagon Drill

The Gardner-Denver Model URM wagon drill eliminates much of the time and effort required for spotting holes. The drill wagon has a dual hydraulic lift, 4-inch drill and RM chain feed. Two hydraulic lifts quickly raise or lower the U-bar while the drilling mast is being maneuvered into position.

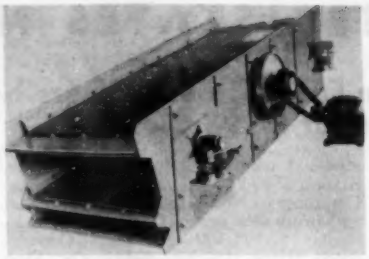


A single drill control handle, conveniently located within the operator's reach on the chain feed, operates all drilling, blowing and hole-cleaning actions. The URM accommodates 8-foot steel changes and features hole cleaning at full line pressure. Circle No. 67.

Bodinson Vibrating Screen Aligns Itself On Any Slope

A new type screen mounting which permits its vibrating screens to be self-aligning on any slope has been developed by Bodinson Manufacturing Co. The screen can be suspended by cables or mounted on a frame with an arrangement of springs and supports so that it will align itself.

These vibrating screens are sturdily constructed, compactly built, simple in

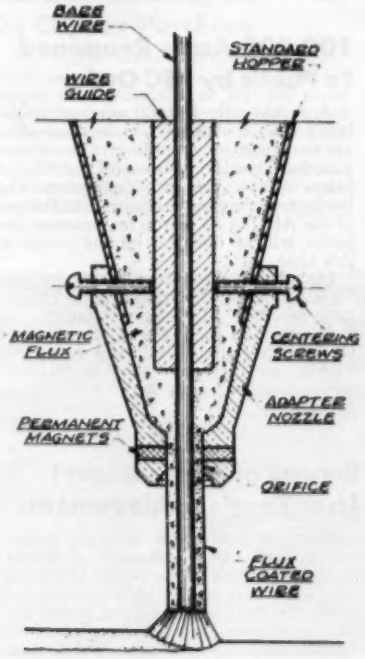


design, and will give trouble-free service. They are available in various sizes with one, two, or three decks. Each unit is furnished complete with motor and drive, and wire mesh or punched plates. For more information on these self-aligning screens, circle No. 61.

IT'S NEW (No.) CIRCLE IT

Magnetic Flux Adapter For Semi-Automatic Welder

A simple and inexpensive nozzle adapter provides a wider range of use for the semi-automatic welder. The adapter

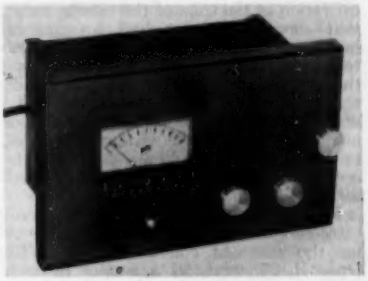


increases the deposition rate of various alloys for build-up and hardfacing. A magnetic field created by the passage of electric current through the bare electrode is utilized to coat the wire with magnetic flux immediately ahead of the welding arc. Permanent magnets in the nozzle prevent the flow of flux whenever the arc is broken.

An open arc is used with the magnetic process, and the welder is able to see the actual welding at all times. This gives him better control of the deposits and permits the hard-facing of irregularly shaped parts. Literature describing the alloy flux and the adapter nozzle is available from the Stoody Co. Just circle No. 63.

Panel-Mounted pH Meter Features Quick Servicing

A compact, panel-mounted automatic pH meter that can be serviced in minutes by personnel right on the job has been announced by Beckman Instruments, Inc. It represents the first industrial pH meter to accommodate virtually any combination of recorder and meter ranges. The circuit allows the recorder pH scale to be shifted up or down, expanded or compressed. The entire pH range or as few as 3 pH units can be recorded full-scale on the recorder chart.



Circuits of the new meter are designed in three "plug-in" units which can be instantly replaced by spares without disturbing panel connections. This feature insures uninterrupted control of pH without the need for trained repair specialists. Bulletin 342-54 gives the details on this pH meter. Circle No. 66 for your copy.

Notes From The Manufacturers

LAWRENCE R. OBERT has been promoted to the position of vice-president and general manager of the Santa Fe Tank and Tower Company, Inc. Mr. Obert joined Santa Fe as an engineer in 1919. His new job with the industrial wood products firm will be to coordinate sales and service activities in all principal cities.

Stewart G. Richmond is manager of E. J. Longyear Company's new sales office in New York City. Mr. Richmond, a veteran of many years in the sales of Longyear diamond core drills and equipment, will manage the Eastern Sales Zone, extending from the Atlantic Ocean to the Allegheny Mountains. The new Central Sales Zone is to be managed by *John H. Bimson*, former United States Bureau of Mines official. Mr. Bimson's headquarters will be in Minneapolis, Minnesota.

John P. Courtright, president and general manager of Marion Power Shovel Company in Marion, Ohio, has been named advisor to a division of the United States Department of Commerce. He was sworn in as a consultant on mining equipment for the Agriculture, Construction and Mining Equipment Division of the department.

UNITED STATES NEWS

Commissioner Day Rules in Favor of Gold Miners Seeking Damage Payments for L-208 Closings

Commissioner William E. Day on March 30, 1954 filed a momentous report with the United States Court of Claims regarding United States government closing of gold mines during World War II by WPB Order L-208. Commissioner Day found that seven gold mines (parties in the damage suit) were in operation at the time of the closing order, that three companies had supplies on hand which would have permitted operations from one to three years, and that the Homestake Mining Company "By reason of the issuance of Order L-208 was deprived of the use and benefit of ownership of its gold mining properties, to wit, the right to obtain gold from the ore bodies on its properties and to sell such gold."

In the opinion of many lawyers, Commissioner Day has laid the ground work for the ultimate conclusion that WPB Order L-208 was, as a matter of fact, arbitrary and unreasonable, and that the mining companies may be entitled to damages.

All parties concerned have 45 days in which to file exceptions. It is certain that the Department of Justice plans to file exceptions, and, as the Court of Claims section is so swamped with work, it also appears certain that they will ask for an additional period of time. Hence, it appears that it will be some time in the fall of 1954 before the case will be argued before the court of claims of the United States.

Consolidated testimony on which Commissioner Day based his findings was started by 16 companies on January 26, 1953 in Washington, D.C. The hearing and findings may be considered a "test case." Any gold miner who incurred damages as the result of L-208 was required, by law, to file his claim before July 14, 1953 under the provisions of Public Law 532—82nd Congress, Chapter 724—2nd Session, S. 3195.

Homestake Mining Company under the leadership of president Donald McLaughlin was the leading factor in the original hearing. Both mining companies officials and former WPB members including Dr. Wilbur A. Nelson, Mining Division head in October 1942, testified. Dr. Nelson reported that he did everything possible to prevent the order and that the true reason for the closures was the belief that 10,000 gold miners would be released for other employment rather than the shortage-of-material reason that the order stated.

While major gold miners and ex-gold miners, such as the Newmont Mining Corporation, Empire Star Mines Company Limited, The Golden Cycle Corporation, the Cresson Consolidated Gold Mining and Milling Company, the United Gold Mines, Inc. and other companies, did not take part in the suit they are vitally interested and some had lawyers at the hearing.

Herewith are the names of the companies referred to in Commissioner Day's findings, the court number of each case, name of mine, location of mine, and the amount of damages sought by the companies: Homestake Mining Company; No. 50195; Homestake mine; Lead, South Dakota; $10,778,448—Alaska Pacific Consolidated Mining Company; No. 49693; Lucky Shot mine; Willow Creek, Alaska; $209,719—Idaho Maryland Mines Corporation; No. 50182; Idaho Maryland and Brunswick mines; Grass Valley, California; $5,021,799—Oro Fino Consolidated Mines Inc; No. 49486; Ora Fino mine; Auburn, California; $72,584—Central Eureka Mining Company; No. 49468; Eureka mine; Sutter Creek, California; $1,256,694—All under No. 50214 the Bald Mountain Mining Company; Trojan mine; Trojan, South Dakota; $167,754—Alabama-California Gold Mines Company; Alabama mine; Penryn, California; $220,000—Consolidated Chollar Gould and Savage Mining Company; Overman mine; Virginia City, Nevada; $175,000—Ermont Mines, Inc.; Portland, Oregen; $50,000.

When the entire Court hears the test cases, it will then be in a position to determine if the government is liable for damages. If the Court holds the government liable, then each filer of a claim against the government will have a chance to present its claims for specific damages. Some 217 claims have been filed.

100,000 Acres Reopened To Public by AEC Order

Approximately 100,000 acres of public lands will be reopened to location after 10 a.m. June 14, according to the Grand Junction Operations Office of the United States Atomic Energy Commission. The lands, temporarily withdrawn for the use of the AEC in its search for uranium deposits, will be open for mining claims at this time.

Included in the restored lands are portions of Mesa, Montrose, San Miguel, Dolores, and Montezuma counties in Colorado; San Juan, Grand, Emery, and Garfield counties in Utah; San Juan, McKinley, and Valencia counties in New Mexico; and parts of Apache county in Arizona.

Bureau of Mines Report Lists Year's Achievements

Intensive work with strategic metals and minerals and perfection of several economy methods involving low-grade ores were two of the highlights of last year's activities of the United States Bureau of Mines. The annual report of the Bureau, covering the year ended June 30, 1953, has just been released by Secretary of the Interior Douglas McKay.

Strategic metals developments included new methods of recovering beryllium ores from domestic deposits and attempts to increase supplies of columbium and tantalum. The Bureau furnished the national supply of metallic zirconium and hafnium during the year and resumed production of ductile titanium.

The Bureau made several advances in the utilization of low-grade ores. Perfection of a low-cost process for making ferro-nickel from low-grade domestic nickel-silicate ores and nickel metals from Cuban nickel oxide was reported. The Bureau also perfected a method of agglomerating slime concentrates into a suitable furnace product as part of its program to utilize low-grade ores.

Iron ore reserves were increased through new investigations in the Alabama Birmingham Basin and the Klukwan deposit in Alaska. Other low-grade ore treatment included concentration by flotation, followed by a leaching process using a Bureau-developed dithionate process to make a product suitable for the manufacture of ferromanganese.

Advances in recovering valuable metals from scrap were also reported. These included a vacuum-leaching method to recover aluminum from scrap alloys or from primary raw materials.

Research progress for the year included production of silicomanganese from rhodonite material, an experimental sulfatizing process for treating low-grade ores from the Cuyuna range in Minnesota, and continued experiments with synthetic mica, mullite, block talc, and problems of asbestos and sulfur supply.

Florida Phosphate Plant Begins Uranium Production

Uranium concentrate is now being produced at International Minerals and Chemical Corporation's triple superphosphate plant west of Bartow, Florida. The plant, in which the uranium is produced as a byproduct of phosphate chemicals, is the first commercial-sized unit to produce uranium in Florida. A second such plant may soon be in the area. Armour and Company, which has been operating a uranium pilot plant near Bartow, is completing negotiations to construct a full-sized recovery plant there.

International built the Bartow plant with its own capital. The government will permit the firm to get this capital back over a 10-year period, and the United States Atomic Energy Commission will pay enough for the uranium to allow the company to make a "modest profit," according to Louis Ware, president. Mr. Ware said that the project is not expected to be a bonanza for the company. "No one in the phosphate business is going to make a lot of money out of uranium," he said.

The AEC has estimated that it is necessary to handle more than 60 tons of ore and overburden to get a pound of uranium. Uranium content of the phosphate rock ranges from 1/10 to 4/10 pound per ton of concentrated phosphate.

HMS Mill For Tioga Mine On Western End Of Mesabi

The Western Mining Company has awarded a design and construction contract to Roberts and Schaefer Company for a new HMS mill at the Tioga No. 2 mine on the western end of the Mesabi Range. Roberts and Schaefer are a well-known firm with headquarters in Chicago who have here-to-fore specialized in coal work.

The new mine will be one of the most westerly Mesabi Range producers. The beneficiation plant will be similar to that of the nearby West Hill plant of the same company. Key unit of the plant will be an 8-by 8-foot Wemco drum separator with a capacity of 230 long tons per hour. Drum feed will be plus-¾-inch and minus-1¾-inch.

Colitz To Mine and Mill Manganese in Virginia

The Colitz Mining Company, a long-time anthracite coal producer with headquarters in Pottsville, Pennsylvania, is entering the manganese mining and beneficiation field. The company has churn-drill-sampled a large low-grade manganese deposit containing much clay at Damascus, Virginia.

Following metallurgical testing by Western Machinery Company and the Colitz Company, which has shown the ore to be amenable to HMS separation, construction of a 1,200-long-ton-per-day washing and HMS plant has been started. Mine stripping for open-pit operations is also being carried on.

The new mill is being built on a hillside adjacent to the mine site. Clay will be removed from the ore by log washers and the prepared feed, plus-3/32-inch and minus-3-inch, will be treated in a No. 3 Wemco Mobil mill with a 6- by 6-foot drum separator. Approximately 80 percent of the feed will be concentrate.

Tantalum-Columbian Users To Pay Production Bonus

The General Services Administration has announced changes in its program of buying and selling columbium and tantalum ores for stockpiling and resale to industry.

Effective immediately, the current 100 percent bonus over the market price which GSA pays for the ores, will be passed along to industry customers. Since August 1, 1952, the government has absorbed the bonus cost to stimulate production of scarce metals.

In the future, the government will accept delivery of tantalum ore meeting stockpile specifications in 1,000-pound lots, instead of the previous 2,000-pound lots. The change will enable small producers to make more frequent deliveries. Minimum acceptance deliveries of columbium will remain at 2,000 pounds.

The GSA has also notified the agents purchasing these ores for the government's account to stop accepting applications from users desiring to buy stockpile specification tantalum or grade 1 columbium. Both have previously been available to industry.

Mining Operations Start At Cal Uranium Property

Mining operations have commenced at Cal Uranium Company's San Juan shaft in the Big Indian Valley area, Utah. Initial shipments of ore are being made to the AEC buying station at Monticello, pending completion of the government crushing and sampling plant under construction at Moab.

Completed on schedule at the mine were the super structure over the shaft, hoist house, skip pocket and haulage level station. The surface installations also include four cabins, a water system, a new modern change room with showers, and a powder magazine.

U.S. and Chile Agree On Copper Purchase

The United States and Chilean governments have agreed upon the general provisions of a purchase of 100,000 short tons of copper for the United States stockpile at market prices. Details of the contract will have to be worked out by the United States, the General Services Administration, and the two major companies in Chile which supply the copper.

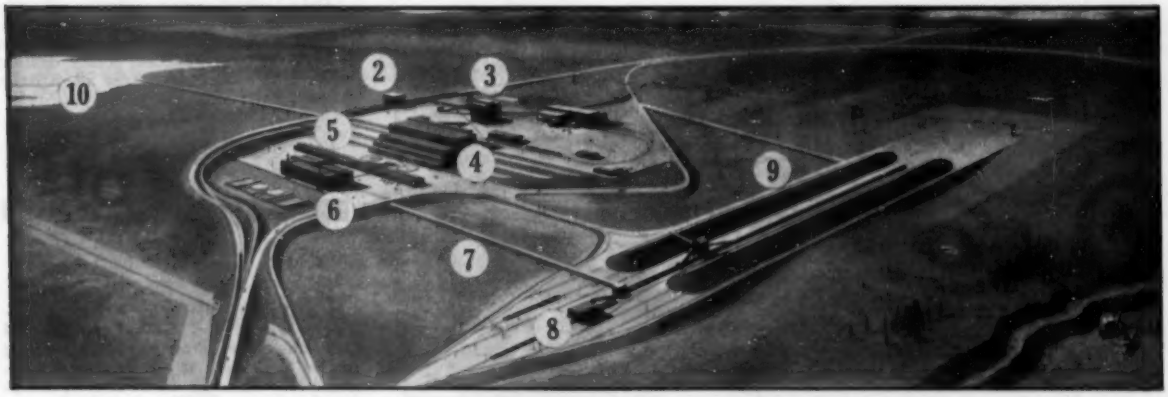
Lease Applicant List Made Public By AEC

The United States Atomic Energy Commission has released the current list of applicants for leases on properties prospected by the AEC. Included are the leading uranium companies, smaller firms throughout the nation, and an assorted group of individuals.

Besides Vanadium Corporation of America, Climax Uranium Company, and the United States Vanadium Corporation, several companies already holding leases have applied for additional rights. They include Golden Cycle Corporation, Colorado Springs, Colorado; LaSalle Mining Company, Moab, Utah, and the Shattuck-Denn Mining Corporation, Uravan, Colorado.

Also on the application list are Newmont Mining Corporation, New York City; Coronado Copper and Zinc Company, Los Angeles, California; Eagle-Picher Company's mining and smelting division at Miami, Oklahoma; Hunt Oil Company, Dallas, Texas; Homestake Mining Company, San Francisco, California; Kerr-McGee Oil Industries, Inc., Tulsa, Oklahoma; Leadville Lead Corporation, Denver, Colorado; Miami Copper Company, Miami, Arizona; Phelps Dodge Corporation, New York City; The Pittston Company, Pittsburgh, Pennsylvania; Rico Argentine Mining Company, Salt Lake City, Utah; Spring Canyon Coal Company, Salt Lake City, and J. R. Simplot Company, Boise, Idaho.

Individuals include a Salt Lake City group, Louis Buchman, James E. Richardson, and DeWitt Van Evra; Ken Garff, also of Salt Lake City; English and Marshall of Farmington, New Mexico; Malcom N. McKinnon, Salt Lake City; Don Danvers, Texas oilman, and Frank L. McKibben, Dove Creek, Colorado.



Erie Mining Releases Artist's Drawing of Taconite Plant

Erie Mining Company's multi-million dollar taconite processing plant and auxiliary buildings are under construction at Aurora, Minnesota. A detailed sketch above shows the planned operation. Areas are: (1) open-pit mining; (2) coarse crushing plant; (3) secondary crushing plant; (4) concentrator (grinding mills); (5) concentrate bedding system; (6) furnace plant; (7) conveyor to car loading hopper; (8) car loading hopper; (9) winter storage; and (10) waste disposal area. Foley Brothers, Inc. have the general construction contract for the entire project which includes construction of a 73-mile railroad from the plant to a port at Two Islands on Lake Superior. The port will be known as Taconite Harbor, and will have an ore dock especially designed to handle pellets. Facilities will be installed at the port to receive coal and fuel oil, and a large coal-fired power plant will also be erected there. This is one of the largest privately financed projects under way in the United States. The firm is owned by Bethlehem Steel Corporation (45 percent), Youngstown Sheet and Tube Company (35 percent), Interlake Iron Corporation (10 percent), Steel Company of Canada (10 percent). Pickands Mather & Co. is in charge of operations. Bethlehem has conducted a series of tests on behavior of pelletized taconite ore at its Lackawanna plant (New York) and has found the pellets blend well with other types of ore in the blast furnace feed, producing iron of uniform quality. The taconite plant is expected to produce 7,500,000 tons of pellets annually, and although no allocation of the supply has been reported yet, it is estimated that Bethlehem will be able to use about 1,000,000 tons at Lackawanna. Production at the Minnesota operation is scheduled to start in 1957.

Idaho-Maryland Finds Tungsten In Its Mines

Discoveries of high-grade tungsten have been made in the mines of Idaho-Maryland Mines Corporation at Grass Valley, California. Installation of a small gravity mill to concentrate the scheelite for sale to the government's stockpile at San Francisco is already under way.

The ore was located on the face at five levels from the 900 to the 2,300 foot, inclusive, in No. 16, 19, and 45 veins. The ore trends toward the old Union Hill mine, now filled with water, which produced over $100,000 in tungsten during World War I days.

Tungsten milling will be separate from the gold recovery mill, with tungsten operations centered in the old Idaho mill using much of the existing equipment. Little new equipment will be needed; primary additions will be a secondary crusher to ¾ inch fineness, jigs, and tables.

Siskon Resumes Gold Mining and Milling

The Siskon Corporation resumed open pit mining and operation of its 250-ton-per-day cyanide plant southwest of Happy Camp, Siskiyou County, California early in April. The operations had been closed during the winter months by the heavy snowfall in the area.

Full production is scheduled from the company's Tennessee and Florida open-pit mines during the summer. Ore will be loaded with two Eimco 105 crawler-mounted loaders. Ore will be trucked under contract 2½ miles downhill from the pits to the mill by T. E. Thompson.

The company has plans to drive a crosscut adit below the Tennessee ore zone to determine its extension in depth and to the west. The portal site has been located but underground work has not as yet been started.

H. B. Chessher of Reno, Nevada is Siskon president, and H. B. Chessher, Jr., general superintendent.

DMEA Restores Minerals To Assistance Program

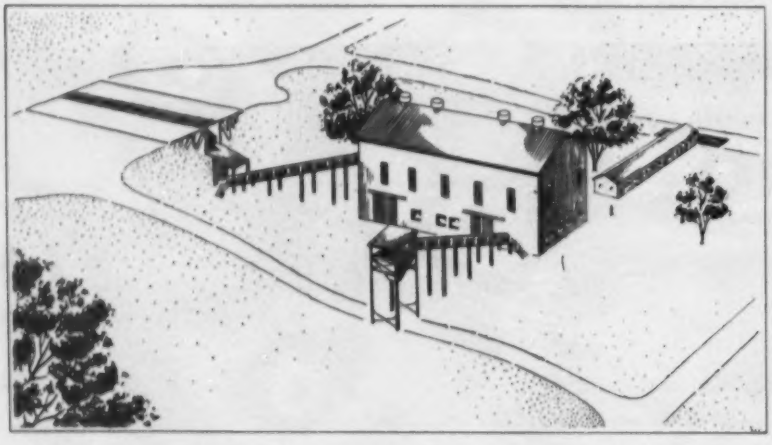
Nineteen minerals have been restored to the Defense Minerals Exploration Administration assistance list, bringing to a total of 33 the strategic materials for which financial aid in exploration projects will be granted.

Returned to the list of minerals for which the government will contribute 75 percent of approved exploration costs are: antimony, corundum, diamonds (industrial), kyanite (strategic), mercury, monazite, rare earths, quartz crystal (piezo-electric), rutile-brookite, talc (block steatite), thorium, and tin. Already on the list are asbestos (chrysotile), beryl, cobalt, columbium, manganese, mica (strategic), nickel, platinum-group metals, tantalum, tungsten, and uranium.

Minerals again on the 50 percent assistance list under the revised regulations are bauxite, fluorspar, graphite (crucible grade), lead, zinc, and cadmium. Also included on the list are chromium, copper, and molybdenum.

The expanded program came as a result of national defense needs, according to Arthur S. Flemming, director of the President's Minerals Policy Committee. He said that the expanded program aims at providing a better knowledge of domestic resources and lessening dependency upon foreign sources of strategic materials.

As of February 28, 1954, the government had contributed $18,443,294 in DMEA exploration projects. Out of a total of 2,078 applications from the mining industry, 627 contracts have been approved. These contracts involve exploration projects for 28 minerals in 31 states and Alaska.



AEC to Build New Utah Sampling Plant at Moab

Construction of a crushing and sampling plant at Moab, Utah has been announced by Sheldon P. Wimpfen, manager of the Grand Junctions Operation Office, U.S. Atomic Energy Commission. The plant, which will be one of the largest uranium ore receiving stations in the Colorado Plateau, is expected to be ready for full operation by September or October. The American Smelting and Refining Company will operate the facility as ore buying agent for the AEC. Although ore specifications at the plant have not yet been announced, the AEC expects to be able to receive limited shipments on a provisional basis starting this month. Purchase will be made under individual contracts with partial payment on the basis of a provisional sample and final payment made after sampling at the plant. The station is expected to provide a convenient market for uranium ores being produced in the Moab area. Another AEC buying station is located at Monticello, Utah. Pictured above is an artist's conception of the finished plant. Bids for construction of the station were opened at the Grand Junction Operations Office April 16.

Shattuck Denn Mining Corporation hopes to complete its new No. 7 shaft at the *Iron King* mine at Humboldt, Arizona in July. The present objective is the 15th level although it will eventually go much deeper. A drift was driven from the 17th level of the No. 6 shaft (the present main operating shaft) to a point under the new shaft and a raise was put up to connect with the bottom of the new shaft. By year's end a new hoist and other equipment had been installed and work was also done on the conveyor system to connect the shaft with the mill. At the mill, new equipment has been installed and old equipment enlarged and improved. With the completion of the new mill and with some further but relatively limited enlargement of the mill, the capacity of the mine and mill will approximate 1,000 tons of ore per day, compared with a capacity of 600 tons per day before the program was initiated and compared with the present capacity of 750 tons and present output of 500 tons.

The *United States Atomic Energy Commission's* Grand Junction, Colorado office has awarded a contract to perform 112,000 feet of non-core, rotary drilling within the Rattlesnake area of Apache County, Arizona.

A $100,000 collection of mineral specimens will be on exhibit at the 1954 Calaveras County Fair and Jumping Frog Jubilee to be held at Angels Camp, California May 21 to 23. In all classes, except that for specimen collecting, entries may be made only by exhibitors who own or operate or, in a bona fide manner, represent the mining properties from which the entries were produced. These entries must be from within the six counties in the general Mother Lode area: Alpine, Amador, El Dorado, Calaveras, Tuolumne, and Mariposa.

After an almost uninterrupted span of 102 years of operation, the *Central Eureka* gold mine near Sutter Creek in Amador County, California has closed. Donald D. Smith, chairman of the board of directors of *Central Eureka Corporation*, said that the company had been spending large sums to maintain the mine in the hope that relief would come, either

through a higher selling price for gold or a settlement of Central Eureka's case with the government over the World War II closing. The company plans to liquidate about $350,000 of its inventory, equipment, and supplies, and will allow the mine to fill with water as rapidly as machinery and equipment can be removed. The main shaft originally was in the *Summit* mine, located in 1855; the *Old Eureka* was in operation in 1852. Other claims in the group included the *Alpha, Railroad, Amador, Maxwell,* and *Wolverine.*

NEVADA

A group of mining men, including Kiester Smith, James Reed, Leonard Tveidt, and Robert Morris, have leased the *Joan of Arc #1, 2, 3, and 4* manganese mining claims seven miles southwest of Goldfield, Nevada, owned by Louis H. Smith. The lessees plan to install a washing plant, and have already moved in considerable heavy equipment including a butane powered compressor, hoist, and bulldozer. Development is progressing according to schedule, with sinking and drifting in ore underway.

Toiyabe Mining and Milling Company's new 50-ton flotation mill is in operation near Gabbs, Nevada. The mill is the third of its kind to be erected in the Gabbs area, for processing of scheelite ore mainly from the Gabbs Valley. Toiyabe buys ore from the small producers for processing, and also treats ore from the *Big Top* mine owned by J. H. Baxter and Thomas Hancock. Mr. Baxter is also president of Toiyabe which is a separate operation. The Big Top is located at an 8,000-foot elevation and has been snowed in all winter. Further exploration of the deposit is planned for spring.

A total of 657,173 short ton units of tungsten had been purchased by February 19 under the Government's purchase program, according to the General Services Administration which handles the government program. The program calls for the purchase of 3,000,000 units of WO_3 or to continue the program until July 1, 1958, whichever goal is first achieved. This means that as of February 19 of this year, approximately 22 percent of the program had been completed.

NEW MEXICO

The *New Mexico Mining Association* has moved its offices from Carlsbad, New Mexico to Santa Fe, New Mexico. C. H. (Pat) Murphy is new executive director of the association.

Tom Bridges of Washington, D.C. reports discovery of uranium near Coyote, New Mexico where he has filed 205 claims covering 4,800 acres. The discovery is said to be the first in eastern Rio Arriba County. Ore would have to be transported 160 miles to Shiprock, the nearest ore buying depot. *Minerals Engineering Company* of Grand Junction, Colorado has a wagon drilling contract for work on the property.

Haile Mines Inc., has acquired and is currently developing a group of manganese claims at Lake Valley, New Mexico. James I. Moore is project manager. *Isbell Construction Company* holds the development contract. A 30-ton-per-hour mill on the property is already running and concentrate is being shipped to the GSA manganese stockpile at Deming.

TEXAS

A uranium discovery has been reported in Gillespie County, Texas by Earl Fogle and H. T. Pipkin of Luling. A contract has been signed with Joe Thompson of Waco to diamond drill the area. The two miners made the find in the area around Gold, Texas on the Nolin Althaus Ranch, 24 miles northeast of Fredericksburg.

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Continuity of a silver-copper vein discovered in February 1953 on the 3,000-foot level of the *Vulcan Silver-Lead Corporation* property in the silver belt of Idaho has been established vertically for 1,000 feet through raising and downhole diamond drilling. The shoot proved to be 700 feet long on the 3,000 level and more than 500 feet long on the 2,800 level. Average width is 6 feet and grade more than 30 ounces of silver and 1¼ percent copper to the ton. A lead-silver ore zone previously encountered has been opened for about 1,000 feet on the 3,000 and 2,800 levels. *Callahan Zinc-Lead Company* owns 56 percent of the Vulcan firm. American Smelting and Refining Company is developing the property under long-term lease.

A silver-bearing ore shoot has been found in the New Purim area of the Shoshone County, Idaho silver belt. It lies in the hanging wall of a vein which was being followed in the 3,200-foot level and which is producing on the 3,000 level above. Development is by *Polaris Mining Company* from its Silver Summit mine workings. Silver Dollar Mining company pays part of the costs. Lincoln Mining company and Hayden Hill Consolidated Mining company also have interests.

Silver Star-Queens Mines, Inc. is raising and drifting on ore in the *Queen of the Hills* mine, Blaine County, Idaho, and stockpiling development ore. In the *Minnie Moore* mine, the company has raised from the 450 level to connect with the old No. 11 level. N. T. Davis is president and general manager.

In a new attempt to end monthly operating losses caused by low zinc-lead prices, *Sidney Mining Company* halved its 70-man crew and leased upper workings of its mine in the Pine Creek district of the Coeur d'Alene mining region, Shoshone County, Idaho. The incentive block-leasing plan is in use. The company planned to continue small stoping operations on the 1,100 and 1,300 levels and exploration work on the new 1,500 level. Also scheduled was deepening of the shaft to the 1,700 level on a two-shift, five-day week basis. Operations has been reduced from six to five days a week on February 1. Production was down to 3,000 tons monthly, less than half of normal, at the time of the leasing decision. Malcolm C. Brown of Kellogg is company president.

Development work on the new 5,500-foot level of the *Star* mine of *Sullivan Mining Company* near Burke, Shoshone County, Idaho has opened zinc-lead ore of greater length and much better grade than exposed on the 5,100 level above. This offset to a considerable extent the grade loss suffered elsewhere in the mine due to lower prices for base metals.

The West ore body in the old *Hercules* mine at Burke, Idaho has been found in place on the new 1,600-foot level, giving an additional 300 feet of depth and providing access to the main shaft hoisting facilities. The lead-silver-zinc ore body was discovered in 1950 on the 1,000-foot level west of old workings which yielded bonanza-type ore in early days. The ore was developed downward 300 feet by winze. The current development is a DMEA project started in February 1953 by *Day Mines, Inc.*

Golconda Lead Mines of Wallace, Idaho has installed a new two-foot Symons cone crusher in its flotation mill. Exploration work on the 1,600 level of the *Golconda* mine was discontinued to concentrate on 1,800 level exploration. C. E. Bloom is mill superintendent and Wray Featherstone, mine manager. A. H. Featherstone, Wallace, has been re-elected president.

Development work at the *Jack Waite* mine on the Idaho-Montana border in the Coeur d'Alene district uncovered some good ore pockets which would warrant increased production under better prices for lead and zinc. Mining and development is carried on by *American Smelting and Refining Company* under a profit-sharing agreement with *Jack Waite Mining Company*, headed by Robert S. Terhune of Seattle.

Efficiency of the *Clayton* mining operation in Custer County, Idaho's Bayhorse district has been greatly improved through adoption of long-hole drilling and blasting, and the drawhole method of pulling ore. Deepening of the shaft for a 75-foot sump and cutting of skip and ore pockets is underway and opening of a new 550-foot level is expected to be started in June. R. J. Legard is resident manager of *Clayton Silver Mines.*

More than nine feet of shaft has been made daily recently by crews deepening the *Crescent* mine shaft in the silver belt of Idaho for *Bunker Hill & Sullivan Mining and Concentrating Company.* Work of pushing the shaft from the 1200-foot level to the 3200 level is nearing completion and a new sinking record seems assured. Up to April 1, progress had averaged approximately 8.3 feet daily. Previous best rate was 6.2 feet established by *Hecla Mining Company* at the Atlas shaft east of Mullan. An Atlas Diesel locomotive has been ordered for the Crescent mine haulage adit. J. B. Haffner is president of Bunker Hill.

Highland-Surprise Consolidated Mining Company has discontinued the night shift at its Pine Creek district property in Shoshone County, Idaho to reduce expenses. The company is doing mostly exploration and development work. Upper levels are being mined by leasers. The block-leasing system introduced last August has proved successful in up-grading production and lowering per-ton cost. Tibor Klobusicky is superintendent.

Silver-bearing ore has been found by *Sunshine Mining Company* in the main Sunshine vein on a new 3850-foot level. Opening of the structure has been deferred to expedite development of the Omega and Rotbart areas of the Chester vein from the same horizon. R. M. Hardy of Yakima is president.

Del Phillips of Smelterville, Shoshone County, Idaho, has leased upper workings of the *Edith Murray Mining Company* property near Murray. Vincent C. Buck of Spokane is company secretary.

New Era Mines Inc. plans to continue an exploration cross cut to open its vein

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system from the 1200 level of the adjoining *Sunset Minerals* shaft. The crosscut is being driven by Sunset under contract. Lester S. Harrison of Kellogg is president.

The *Utah-Idaho Uranium and Oil Company* of Pocatello, Idaho was incorporated by J. R. Black, F. B. Carter, and G. R. Cochran, all of Pocatello, with a capital of $100,000. *Uranium Mines, Inc.* of Wallace was also incorporated recently for $500,000 by H. F. Magnuson, Richard G., and Elsie W. Magnuson, all of Wallace.

William French is managing the project of building the second elemental phosphorus furnace at Soda Springs, Idaho by *Monsanto Chemical Company* which will cost over $1,000,000. It is to be in operation this fall, and will double production at the plant. Holder of the contract is Wigton and Abbott, construction engineers of Plainfield, New Jersey. The new furnace is designed by Monsanto engineers and will be housed in a building at the south end of the location of the first furnace, completed in December 1952.

Keith Madill shipped his first carload of manganese ore from his mine near Lava Hot Springs, Idaho to the Butte, Montana depot of the General Services Administration.

MONTANA

Mitchell Mining Company of Mount Vernon, Washington, has contracted with *Contract Milling Company* of Spokane to mill gold-silver-lead-manganese production from the *Margaret Ann* mine at Walkerville in the Butte, Montana district. The Spokane firm is to move in a plant and process the ore for two years on a contract basis. Plans call for the plant to be operating by June 15.

Inspiration Lead Co. Inc, has cut silver-lead-copper ore in the new lower adit at the *Oro* mine near Troy, Montana after driving more than 400 feet. Three veins were crosscut in a sheared zone about 15 feet wide. The new tunnel gained more than 100 feet of depth below the No. 2 tunnel from which several smelter shipments were made by previous operators. W. H. Simons and R. R. Weideman are in charge.

Taylor-Knapp Company is unwatering the 1,000-foot-deep True Fissure shaft in the Philipsburg district, Montana, and is planning 9,000 feet of exploration on the 900 level. Deeper exploration of the firm's nearby *Durango* mine also is planned. Good-grade manganese carbonate ore was opened by the company on the recently explored 800-foot level of the *True Fissure* mine.

OREGON

Installation of a Raymond mill with cyclones is planned by *Malheur Wunder Earth, Inc.,* Vale, at diatomaceous earth deposits in the Harper-Westfall area of northern Malheur County, Oregon. Don-

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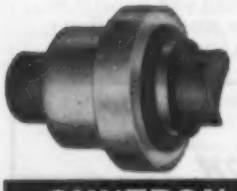

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NORTHWEST

ald Galbreath of Vale is president, and Dan Hartley of Portland is secretary.

Great Lakes Carbon Company and *Johns-Manville Corporation* have optioned hundreds of acres covering diatomite deposits in the Drewsey area of Harney County, also in southeastern Oregon. Exploration work this summer will determine if the deposits are large enough to warrant construction of processing plants.

WASHINGTON

American Smelting and Refining Company's Van Stone open-pit zinc operation in the Northport district, Stevens County, Washington, is scheduled to complete its DMPA contract this summer. Production started in the fall of 1952 and the mill has been handling 30,000 tons of ore monthly since March 1953. The Defense Materials Procurement Agency agreement provided for a floor price of 15½ cents a pound for 36,872,000 pounds of zinc produced during the first three years of operation or until company earnings totaled $683,000. P. A. Lewis is superintendent.

American Zinc, Lead and Smelting Company has completed exploratory drilling of its property adjoining the *Grandview* lease north of Metaline Falls, Pend Oreille County, Washington. The work indicated a substantial tonnage of lead-zinc ore. Plans call for developing the property from lower levels of the Grandview mine when prices of base metals improve sufficiently. Dale I. Hayes, Spokane, is western manager.

Sunny Peak Mining Company has started development work in the old *Gubser* mine one-half mile north of Conconully, Okanogan County, Washington. A new road has been built to the tunnel and a gasoline-powered air compressor, mucking machine, air trammer and other machinery installed. A contract has been let to *Wilson Brothers* of Plains, Montana, to extend the 800-foot adit 100 feet to intersect the projected extension of a vein which yielded silver-lead-copper ore near the surface years ago. Dale Lanphere of Spokane is vice president.

Big Q Tungsten Mine, Inc. is resuming work at its property on the north side of Blue Grouse Mountain in southern Stevens County, Washington, following a winter shutdown. Mill improvements are planned; also exploration under a $10,000 tungsten exploration project approved by the DMEA last fall. Prior to the winter shutdown, the main adit was extended 120 feet and a 97-foot raise driven to connect with an old shaft and eliminate ore hoisting. One ton of tungsten concentrates were sold to the GSA for $3,502. William M. Quigley, Seattle, is president.

On the south side of Blue Grouse Mountain, *Sunshine Mining Company* is continuing exploration of the *Little King* tungsten prospect. Diamond drilling was scheduled from the face of a 280-foot adit driven by the big north Idaho silver producer. A minor fire recently damaged the compressor plant. Rowland King of Spokane, Sunshine exploration engineer, is in charge.

Production from the *Ozark* mine of the *Ozark Ore Company*, a subsidiary of *M. A. Hanna Company*, set a new record in 1953 with 240,000 tons. The mine completed its changeover during the year from an open-pit operation to underground methods. Open-pit production had yielded a siliceous iron ore averaging 30 to 35 percent iron which was treated in a jigging plant to yield concentrate averaging about 55 percent iron and 10 percent silica. By the 1953 season, operations were completely underground. The mine is located at Iron Mountain, Missouri and accounts for most of the state's iron ore production.

The *Osceola* mine of *Calumet and Hecla, Inc.* has now been dewatered to the 1,200-foot level where a permanent pumping station is being located. New headframes are under construction at two of the old shafts and will be ready for use as soon as dewatering is far enough along to begin development work. Calumet and Hecla maintained production throughout 1953 from the Kearsarge Amygdaloid and Houghton Conglomerate Lodes of the *Douglas* property in Michigan. A total of 6,016,301 pounds of copper was produced as compared with 6,815,727 pounds in the preceding year. Average recovery was 22.93 pounds per ton. Development work in the Houghton Conglomerate was continued with active stoping. No further work was done to develop additional tonnage on the Kearsarge Lode during the year and production from this area is rapidly approaching completion.

E. I. du Pont de Nemours & Company expects the expansion of its titanium facilities at Edge Moor, Delaware to be in full production during the second half of this year.

During 1953, *Bethlehem Steel Company* progressed with shaft sinking at its *Grace* mine near Morgantown, Pennsylvania. Shaft "A" was sunk to a depth of nearly 1,300 feet; shaft "B," a man-and-materials shaft, was down below 700 feet at the end of the year. Iron ore at the Grace mine lies at a depth varying from 1,500 to 3,000 feet. Mine office and its change house, main hoist, and compressor building, machine shop and warehouse, carpenter shop, garage, and oil house were finished during the year. Also completed were the railroad spur and loading tracks. Underway were construction of the mill office and its change house (now completed), the mine's sewage system, water system, and other auxiliary services. U.S. Highway No. 122, which passed directly over the ore body, was rerouted at the company's expense.

Callahan Zinc-Lead Company reports that examination of the alluvial deposit in South Carolina containing monazite, ilmenite, rutile, and zircon has been completed. Callahan holds a 25 percent interest in the property which is presently under option to a large industrial firm which has requirements for the minerals contained.

Banana Lake near Lakeland, Florida is under consideration as a possible future phosphate mine. Trustees of the state Internal Improvement Fund are reported to be considering "leasing the right to explore, develop, and mine phosphate from the bottom of Banana Lake."

One of the principal surveys being conducted for mineral-bearing sands containing thorium and rutile is that being made by the *Crane Company* which, through its subsidiary *Cramet, Inc.*, is building a titanium metal plant at Chattanooga, Tennessee. Crane is reported to have established an office at Panama City on the Gulf of Mexico from which its geologists are going out to check points along the west coast of Florida. The firm is also said to have leased several thousand acres in that area.

Trial-run shipments of ore have been unloaded at the *Pennsylvania Railroad's* new $10,000,000 ore pier on the Delaware River at Greenwich Point, Philadelphia. Formal dedication takes place soon. Utilizing the most modern electrical equipment, the pier is expected to be able to unload two ships at once at the rate of 3,600 tons of ore per hour. Provision has been made for expanding the facilities to handle four ships simultaneously at 10,800 tons of ore per hour. The new pier is designed particularly to receive the increasing amounts of foreign iron ore for United States steel centers.

A custodian, John Glenn, has been appointed by the federal court to oversee the expensive electrical equipment still installed in the *Westmoreland Manganese Corporation's* plant now under federal receivership. E. L. McHanley, Jr. is the appointed receiver for the government. The plant, located at Batesville, Arkansas, was built with a $3,000,000 government loan.

Davison Chemical Corporation's sulfuric acid plant near Bartow, Florida is in operation. Its rated capacity is 550 tons of 100 percent acid per day. The unit

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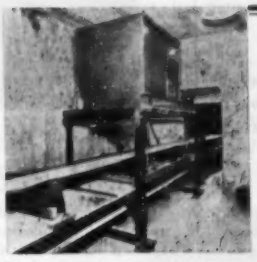

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is part of the triple superphosphate plant presently under construction by Davison at Bartow.

Two Virginia congressmen have called upon the government to set up a manganese purchasing depot in the state of Virginia. Congressmen B. P. Harrison, and Watkins M. Abbitt say that Virginia is now shipping more manganese ore than any other state under the high-grade manganese purchasing program.

IRON RANGES

The new mill at the *Humboldt* mine near Ishpeming, Michigan was started up during March and reached full capacity of 70 long tons per hour in April. Humboldt is a joint venture of the *Ford Motor Company* and *Cleveland-Cliffs Iron Company*. E. W. Lindross is plant superintendent.

Ashland Mining Corporation plans to explore for iron ore in Ashland County, Wisconsin this year, extending beyond the present most westerly iron ore mine at Montreal, Wisconsin. The *McLouth Steel Corporation* of Detroit, Michigan has an option to purchase a half interest in the firm.

The state-owned *Leonidas* mine at Eveleth, Minnesota, which is currently under lease to the *Oliver Iron Mining Division* of the *United States Steel Corporation*, will be reopened soon by the *North Range Mining Company* of Negaunee, Michigan. Under a sublease from Oliver, North Range plans to mine the shaft pillar ore body, containing an estimated 1,900,000 tons of ore, and already has started work on the property. Oliver is engaged in cleanup work of the open pit in the area which will be caved by North Range operations. The new operation is expected to employ from 75 to 100 men during the next 10 years. The Leonidas was once the largest producer of underground iron ore in the state. The underground mine has not been operated since 1943, however.

Inland Steel Company plans expenditure of $35,000,000 in 1954, an increase of $11,000,000 over 1953 investments in new facilities. The year's plans include an addition to power generating capacity at the Indiana Harbor steel plant, and construction of six new soaking pits which are ovens for reheating steel ingots before they are rolled into smaller shapes.

Cleveland-Cliffs Iron Company has cut back operations to a four-day week at its iron ore mines on the Marquette Range, Michigan. Grover J. Holt, general manager of the company's Ishpeming, Michigan mines, reports that the upturn in business generally forecast for April 1 did not appear and continued stockpiling of excessive tonnages of iron ore is not now justified. Total shipments from CCI-operated mines on the Marquette Range last year were 4,591,000 tons, which set a new record.

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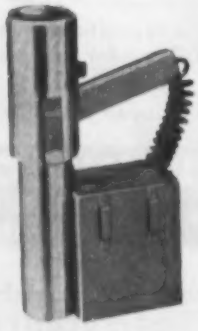

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Colorado Exploration Company reports discovery of uranium deposits nine miles north of Canon City, Colorado in the Garden Park area. Mineralization is in Dakota sandstone and is restricted to a single permeable, fossil wood-bearing member. Surface samples of thorianite—thorium, uranium, and oxide—showed a uranium content of 0.16 percent. Dr. W. Alan Stewart of Golden, owner of the firm, says that the company expects to begin a core drilling program during the summer. Preliminary findings indicated the ore body would not be more than 150 feet deep at the point where overburden is the thickest.

First reported application for leases under the U. S. Atomic Energy Commission's Circular 7 (see page 33) was filed by *Climax Uranium Company* on March 2 in the Mesa County clerk's office. The application is for 18 tracts in the Gateway district of Colorado.

Location certificates for almost 200 claims were filed with the county clerk in Mesa County, Colorado during one week in March. The largest number of claims were filed by J. W. Lewis in the North Gateway district. Among other filers were Standley P. Balcomb of Colorado Springs and Raye Benham of Dolores; Carrol Wilcox and Leo High; John R. Munro for *Blue Creek Mining Company;* Fred B. Misner and Elizabeth Baumgartner; Glen, Norva, and Joe Berry, and Vernon Pick.

Slagter Exploration Company has reported a discovery of uranium- and vanadium-bearing ore in Monument Canyon, San Juan County, Utah. The strike was made on the *Pure Luck* claims owned by J. B. Sanchez, Clyde Sanchez, and Virgil Long. Slagter's western division conducted the exploration work. Superintendent is William Barbre, of Dove Creek, Colorado. The company has leased the claims and will have charge of all development. About 20,000 tons of carnotite ore are reported to have been indicated by drilling in the Morrison formation. Bunk houses, a cook shack, and ore bins have been constructed and shipments are expected to start soon.

The *Gramlich Exploration Company* of Moab, Utah is in the final stages of stripping operations on an ore body in the Morrison formation south of the La Sal Mountains, 22 miles south of Moab. Approximately 700 tons of 0.34 percent U_3O_8 and 1.80 percent V_2O_5 are in the final stages of stripping. According to J. W. Gramlich, president of the company, approximately 20 tons of ore per day are scheduled to be shipped. Diamond drilling to total 8,800 feet was started early this month on 70 unpatented claims in the La Sal area under provisions of a Defense Minerals Explo-

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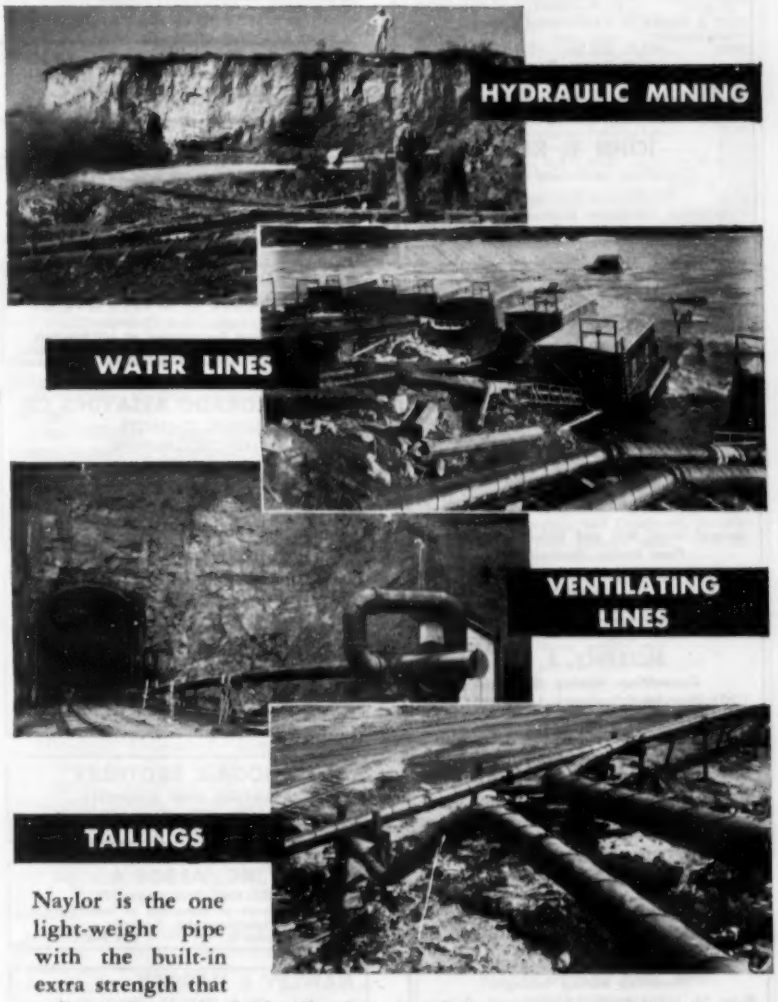

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ration Administration loan. The company, formerly known as *Gramlich Minerals, Inc.*, has sold 69 claims to the *Four Corners Uranium Corporation*, a subsidiary of *Silver Bell Mines Company*, Denver, Colorado. Four Corners has properties in Montezuma and San Miguel counties in Colorado, Grand and Emery counties in Utah, and portions of Wyoming, in addition to the Gramlich claims in Colorado and Utah. A drilling program on two of the Four Corners properties is planned by the U. S. Atomic Energy Commission, and the firm has just signed a contract to drill 130,000 feet on another one of its properties.

WYOMING

The U. S. Atomic Energy Commission has contracted for 80 test holes to be drilled 260 feet on Thron Ridge, adjacent to *Homestake Mining Company* operations. The new project involves 20,000 feet of core drilling near Carlile, Wyoming.

Bad weather began slowing up the uranium rush in Freemont County, Wyoming by the end of March. The temporary lull in claim filing marked the end of a month-long stampede of prospectors to the Green Mountain area, which began during the early part of the month. During the first stages of the rush, 100 claims were filed in a period of six days. Original discovery reportedly was made by three Lander, Wyoming men, Floyd Bishop, Charles Spurlock, and Merritt Hopkins, near Crooks gap last December, but claims were not filed by the group until February 27. Since that time hundreds of claims have been staked along the southern flank of Green Mountain.

Metallics Unlimited, Reno, Nevada, has leased the *Rock Creek* property south of Lander, Wyoming from the *Wyoming Mica and Metals Corporation* and plans to begin sampling and testing for mica and gold deposits immediately. Production is anticipated at 1,000 cubic yards per day, according to Ralph Thurston and A. J. Pouch, partners in Metallics Unlimited.

Several new uranium claims have been filed at Lander, Wyoming, recently. Claims reported by Lawrence J. Bergsten, of Oakland, California, and his partner Virgil R. Herring, of Aptos, California, include two areas—one in Red Desert and the other in Crooks Gap on the edge of the Sweetwater Valley. Other claims filed at Landers included six in the Beaver Divide area southeast of Landers, which were filed as the *Ace Group* claims.

The Wyoming Land Board recently approved 42 uranium leases on state land. Of these, 40 were in the name of the *Pioneer Oil Company* of Denver, Colorado. These included 15 in Weston County, 15 in Niobrara County, 7 in Big Horn County, 2 in Creek County, and 1 in Platte County. The other two applications coverd leases by *Lucky Mac*, a Riverton partnership composed of Neil McNeic, Lowell A. Merfeld, J. M. Wade, and Roman J. Verhaalen. Other applications have been filed but at this writing results of processing have not been made public.

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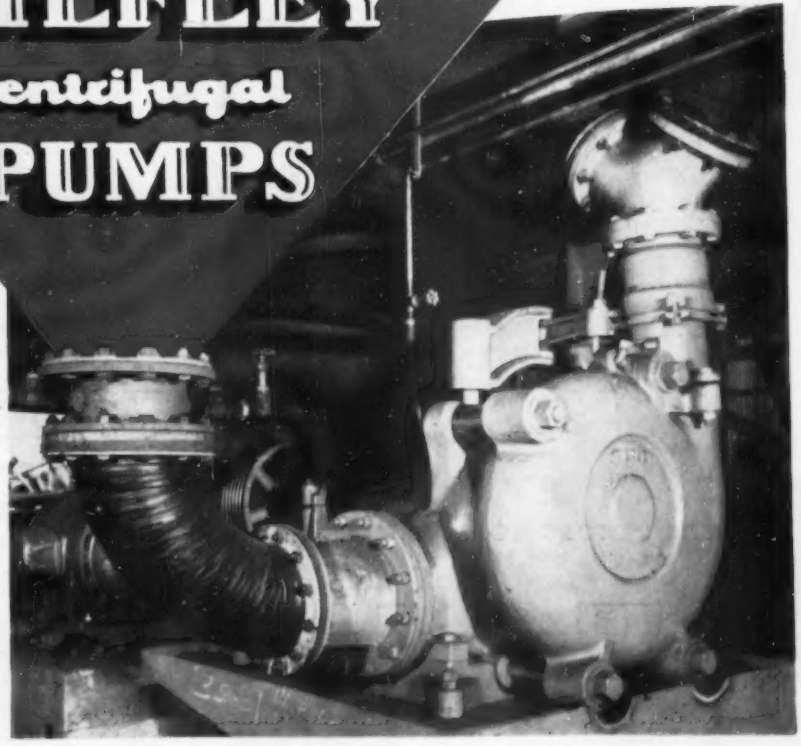

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